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THE TASKS OF SOVIET MILITARY SCIENCE
IN LIGHT OF THE DECISIONS OF THE 24TH CPSU CONGRESS

It is noted in the accountability report of the CPSU Central Committee, in the directives for the five-year plan for development of the USSR national economy for 1971-1975, in the resolutions, and in other documents that all the great victories of socialism in our country and in the international arena were achieved by the Soviet people under the leadership of the Communist Party which bases its work on the all-conquering Marxist-Leninist teachings. Relying on revolutionary theory and a recognition of the objective laws of development of society, the Communist Party is developing and implementing a policy in the areas of the economic, social and spiritual life of the country and also in the area of military defense of the socialist homeland.

In resolving the problems of practical guidance for the society and its armed defense, the party continues to develop Marxist-Leninist theory further. This is manifested primarily in prompt analysis of new conditions and possibilities for development of communism in our country, in the development of the world socialist system and revolutionary movement, and in the search for more effective ways of resolving urgent problems. The accountability report of the Party Central Committee says: "...the party sees as its most important task the finding of a solution to the pressing problems of communist construction on a basis of Leninist ideas and Leninist methodology."

The 24th Congress presented an example of scientific analysis of the present stage of the struggle between socialism and capitalism in all spheres and especially in the area of the economic, scientific and technical competition between the two world systems. It clearly defined the role of scientific and technical progress in the course of the historical antagonism between the two systems and emphasized that the simultaneous development and interrelationship between the socialist, national liberation revolution and scientific and technical progress make our age the most revolutionary in the history of mankind. This is why "decisive acceleration of scientific and technical progress," noted L. I. Brezhnev, "remains one of our most important tasks."

In an age when science is increasingly becoming the direct producer of power, successful construction of the material base for communism and reliable defense for it depend on the entire gamut of natural and technical sciences and on their effectiveness. The party congress pointed out that to ensure a high scientific and technical level for all industry requires further development of fundamental research and concentration of efforts and the attention of scholars on the more important and advanced areas of

scientific and technical progress and on acceleration of the introduction of scientific achievements into industry.

Discussing the importance of scientific and technical progress, L. I. Brezhnev said, "Having begun under the influence of science and scientific discovery, the revolution in the development of the productive forces will become ever more significant and profound. We have before us, Comrades, a task of historic significance: to organically combine the achievements of the scientific and technical revolution with the advantages of the socialist system of economy and to develop more extensively the forms of combining science and industry which are our own and inherent in socialism."

The social sciences are faced with equally important tasks. It is stated in the accountability report of the CPSU Central Committee that "what we need is a more decisive revolution of the social sciences in the direction of working out urgent problems of the present and the future." This attitude of the party toward the social sciences arises from the common goal of party leadership and the social sciences and their common object of study and influence. In order to mobilize the masses of workers to create a new society and defend its conquests, in order to ensure unity in the will and actions of the people, in their purposefulness and enthusiasm, the party must rely on scientific theory and be guided by the information of the social sciences.

As a whole, the social sciences participate in the development of the general policy for socialist and communist construction and in the determination of the most important bases and concrete paths toward development of society. They reveal the connections and the interrelations of various spheres of social life -- economic, social and ideological -- catch the changes taking place in these spheres and in the moods and actions of the masses of people and reflect them in appropriate theoretical propositions. Thus, the social sciences provide the party with a reliable means of directing social life and make it possible to earmark more effective ways to achieve historic goals.

In addition, the social sciences are in the vanguard of the ideological struggle against anti-communism, bourgeois ideology, and right-wing and "left-wing" revisionism. The successes in the development of the social sciences contribute to the successes in the ideological struggle between the two antagonistic socioeconomic systems.

Having outlined the general line of development of the natural and the social sciences under present-day conditions and their place and role in communist construction and in implementation of the five-year plan for development of the USSR national economy for 1971-1975, the 24th CPSU Congress outlined the most important features of the development of science.

First of all, there will be further intensification of the process of integrating sciences and bringing them closer together in resolving fundamental scientific and special problems. And this in turn requires rapid development of a broad range of scientific research and closer contact among scholars working in various areas of the natural, technical and social sciences.

The resolutions and materials of the congress take note of the changeover to a stage of intensive development of science. This means creating conditions which ensure both that fundamental scientific problems will be resolved rapidly and that the time required for introducing scientific achievements into practice will be reduced. This includes material production, social relations, and the sphere of ideological education of the masses.

In relation to this the congress devoted an enormous amount of attention to the following aspects: utilizing the advantages of socialism and ensuring accelerated development of science; deepening the ties between science and practice which are inherent in socialism; increasing the effectiveness of scientific creativity; improving the style of work of scientific research institutions and their work methods; establishing a creative and comradely environment in the scientific collective; and further developing criticism and self-criticism and raising the ideological and theoretical level of scientific personnel.

In addition to a general statement of the tasks for Soviet science, the resolutions and materials of the 24th Party Congress provide instructions regarding the direction of development and the number of forthcoming tasks for each particular science. This ensues from the Marxist-Leninist approach to analysis of facts and phenomena in the present stage of construction of a new society. This information comes primarily from a deep and comprehensive analysis of the international situation and the trends toward change in the social forces in the international arena.

Through the years the position of our socialist state has become more solid. The importance of the world socialist system has increased. The Soviet Union and the fraternal socialist countries have made a large contribution to the struggle for peace and security of peoples and have exerted an ever increasing influence on the further change of the alignment of forces in favor of peace, democracy and socialism. The union of the basic revolutionary forces of the present, the world system of socialism and the international workers' and liberation movement is becoming ever stronger and deeper. This circumstance was a decisive factor in the frustration of the latest attempts on the part of imperialism to halt the movement of world revolutionary forces and interfere with the consolidation of socialism.

Yet the reactionary nature and the aggressive aspirations of imperialism have not changed; they are manifested even more clearly in the policy of the U.S. This idea is confirmed by the fact that after the Second World War the forces of aggression and militarism unleashed 30 more wars and armed conflicts of various proportions. In postwar years in the capitalist world the arms race is proceeding with unprecedented intensiveness and militarism is increasing. In 1970 alone the NATO countries invested 103 billion dollars in preparing for war. All this shows the continuing threat of war by the imperialist powers.

The 24th CPSU Congress noted that Marxism-Leninism has now been enriched with new conclusions and generalizations which are of great importance for further development of the social sciences and particularly for resolving theoretical and practical problems having to do with increasing the defense capabilities of the socialist states and the military might of their armed forces.

It is very important to develop further Marxist-Leninist basic ideas concerning the military power of states and war, their essence and content. The Leninist concept of war as an extension of politics through violent means has been developed in all ways. This definition clearly reflects an attitude toward war as a social and historical phenomenon.

On the basis of political requirements, a deep and comprehensive calculation of the international situation, and the economic and moral capabilities of our state and its probable enemies, Soviet military science is called upon to study the nature of military activities in the next war, the laws, principles and methods of waging it in defense of socialism, forms of organizing armed forces and controlling them, and ways and means of training, educating and in all ways preparing the troops for gaining victory over the enemy. Thus, Soviet military science is an important factor in strengthening the defensive power of our homeland.

Imperialism takes advantage of all means in trying to hold back the course of social progress. It reinforces existing aggressive blocs and creates new ones and tries through economic pressure to impose its will on states and whole regions of the world. Imperialism is waging a bitter ideological struggle against the forces of progress and democracy, organizing sabotage, graft and murder in order to overthrow objectionable regimes and state activists, and waging an aggressive war against peace-loving peoples.

Analysis of present-day imperialism and its striving to adapt to the new world situation places before military science the task of revealing even more thoroughly the essence and characteristics of aggressive wars which are being waged now in various regions of the world and also foreseeing the possible nature and content of the war against the USSR and the socialist states for which the imperialist forces are preparing. This task is

of practical significance because it has to do with directing the efforts of our state and those of all socialist countries and their armed forces toward ensuring victory over any aggressor who dares to attack the Soviet Union or other countries of the socialist community.

Guided by Marxist-Leninist methodology, Soviet military science considers that the defense capabilities of our country and of all socialist states and their ability to repulse any aggression from imperialists depend on economic, moral and military capabilities which depend on the sociopolitical structure, the level of development of productive forces, the degree of consolidation of the masses of the people around communist and workers' parties, and all-round political, economic and military cooperation of socialist countries which is becoming ever closer and more active.

Future prospects, noted in the directives for the Ninth Five-Year Plan, will create a firm basis for increasing the power of the Soviet state, which will make it possible to defend even more reliably the Soviet people and all countries of the socialist community from the danger of imperialist aggression and to consolidate the position of peace-loving and liberation forces in the entire world. The increasing combat strength of the Soviet Armed Forces, which represent a concentration of the country's defensive power and its main and decisive force, are capable of restraining and destroying any aggressor.

The Soviet Armed Forces are an entirely new type of organization which is basically different from the military machine of the imperialist powers. The armed forces are the weapon of socialist, really the people's, power. They reflect the class union of workers and peasants, the friendship of peoples, the moral and political unity of the Soviet society, socialist patriotism and proletarian internationalism, and the nature of the socialist social and state structure. This also predetermines their essentially new social role and the meaning and importance of all of their activities.

The basis of the Soviet military structure is the Communist Party's leadership of the Armed Forces. For more than half a century the Communist Party has provided solutions to problems of defending the conquests of the Great October Socialist Revolution, routing enemies at home and abroad, developing socialism and communism, and creating powerful armed forces equipped with first-class combat technical equipment and arms.

The firmness of Lenin's principle of party leadership for the army and navy has been put to the test in two grim wars and many years of experience in the life and activities of the Soviet Armed Forces. The Armed Forces personnel are obligated to the Communist Party for their unsurpassed moral and political as well as high combat qualities.

Lenin's idea of strong leadership of military organizational development by the Communist Party was further developed in the materials and resolutions of the 24th Congress. Providing political guidance and improving party political work in the army and navy is considered by the party to be one of the most important of its tasks. All this makes it necessary to study even more deeply the military and theoretical legacy of V. I. Lenin and the activities of the Communist Party in the area of military development and use them for increasing the defense capability of the country and our Armed Forces.

Among the primary and major tasks of military science under modern conditions is the development of ways and means for further increasing the combat readiness of the Armed Forces in keeping with the ever increasing demands. USSR Minister of Defense Marshal of the Soviet Union A. A. Grechko said in his speech at the congress: "We are well aware of the instructions of our party concerning the constant readiness of the army and navy to defend the socialist conquests of the Soviet Union and we are doing everything possible so that the defense capability of our country will be reliable on all of its levels and in all of its areas." Raising the level of combat readiness of the Soviet Armed Forces is an objective need caused by the intensified aggressiveness of imperialism, the increase in the arms race, the growth in militarization, and the strengthening of military-political blocs whose power is directed against the Soviet Union and other socialist countries.

In the accountability report of the CPSU Central Committee at the 24th Party Congress the combat readiness of the Soviet Army and Navy was given a high rating. But the demands are increasing all the time. The time is long past when only a certain part of the troops, mainly those on the borders, had to be combat ready. In our day the great range of missiles and aircraft, their immense speeds of flight and their unprecedented destructive force make it necessary to keep all branches of the Armed Forces constantly ready for immediate action.

The criteria for judging the combat readiness of the Army and Navy are also changing. Under modern conditions they must be in a position to repulse a sudden attack by the aggressor at any time, using both nuclear and conventional weapons. They must be able to destroy the main groupings of the enemy's nuclear missiles and troops with crushing and rapid attacks, thus creating the necessary conditions for ending the war successfully. The time factor also takes on special importance here since the troops must reach a state of combat readiness in the shortest periods of time.

Increasing the combat readiness of troops at all levels is a multifaceted problem. Much has already been done about this. In the future it will be necessary to have an authentically scientific basis for continuing to search for new reserves and ways of reducing the amounts of time necessary

for making the troops combat ready. It will also be necessary to develop new norms involving less time. In resolving this problem our command personnel must take into account that it includes almost all aspects of troop activity. Increasing combat readiness is an interrelated system of measures which is concrete and specific on all levels of organization of the armed forces.

In an age of nuclear and missile armament, jet aircraft, nuclear submarine missile-carrying fleets and radioelectronics, combat readiness has become the sum total of many important factors. Its basis is an improved material and technical base. But arms and combat equipment without people to use them are dead. Therefore, combat readiness depends directly on a high level of technical training of personnel as well as on their combat skill. It is unthinkable unless all troops have good moral, political and psychological qualities. They must have excellent mastery of field, naval and air training. The commanders and staffs must be able to control the troops in combat situations and must have irreproachable military discipline, organization and order.

All the work of command, political, and military and scientific personnel, of staffs and political agencies and troops as well as of the party and Komsomol organizations must serve the purpose of increasing combat readiness. All measures directed at resolving this central problem must include systematic substantiated correctives which are necessary for improving means of combat and developing the entire military field.

One of the most important tasks of military science is exploring ways of reliably repulsing sudden attacks from any enemy, frustrating his aggressive intentions, further developing more effective means of organizing and conducting decisive combat operations which are in keeping with the modern level and future prospects for development of means of armed combat, with the various conditions at the beginning of a war and while it is being conducted and which can ensure that victory over the enemy will be achieved with the least possible losses and in a short period of time. It is necessary to devote more attention to comprehensive exploration of problems of organizing and sustaining cooperation among various forces and means when fighting an enemy on land, in the air, and at sea. It is also necessary to pay more attention to the complex conditions of the radio-electronic situation, the struggle against enemy interference, and the insurance of concealment and careful camouflage of troop operations. Successful fulfillment of this task is inseparably linked to a deep and prompt study of military and political as well as strategic ideas about the imperialist state, especially the U.S., the scope and essence of their military preparations, the ways and means they might use in conducting war, and also ways by which one kind of war might develop into another.

It is also necessary to further develop and study problems of increasing the mobility of all elements of the rear services and organizing uninterrupted and comprehensive troop support under conditions when they are carrying out active operations during conditions of mass losses of personnel and technical equipment and interruptions in communications.

Organizational development of the Army and Navy must correspond fully to the tasks the armed forces will have to perform in a nuclear war. Therefore, research and scientific development of the best quantitative and qualitative relations between people and technical equipment and between various kinds of troops is one of the pressing problems pertinent to military science and the practical activity of commanders, staffs and political agencies. Taking into account the basic changes in military affairs and the very nature of a possible war, Soviet military science must provide constant improvement in the organizational forms for troops, in the structure of the units and combined units, in the principles of staffing them, and in mobilization and training.

The important tasks of military science also include further elaboration of problems in the moral, political and psychological training of the troops, something which is becoming especially important under modern conditions. The essence of the problem is that every serviceman must consolidate his moral, volitional and physical capabilities and, on the basis of this, develop spiritual persistence and constant readiness to undergo any harsh tests of modern warfare. He must retain his will to win under the most difficult of circumstances. Servicemen must develop the ability to control their behavior and act in a most complicated and difficult situation. They must retain their discipline and organization.

There is a great deal of work to do in the area of improving methods of controlling troops using new technical equipment.

Military science is expected to contribute to the development of technical equipment for control and to the improvement of a communications system. Military science must help to make it possible to use computer technology and other means of automation on a broader scale and to use them skillfully, which will have a positive influence on accelerating the process of obtaining, processing, analyzing and feeding back information for making well substantiated decisions and rapidly conveying them to the executors.

Speaking at the Congress, A. N. Kosygin noted that it is necessary "to control in a new way, on the basis of profound mastery of Marxist-Leninist theory, the theory and practice of control, scientific organization of labor, new methods of planning and economic stimulation, and the use of economic and mathematical methods and modern computer technology."

Theoretical comprehension and practical utilization of the rich experience of the Great Patriotic War are still important. This is a matter not just for military historians, but for all military personnel. Minister of Defense Marshal of the Soviet Union A. A. Grechko noted, "The modern development of military affairs and the means and methods of waging war in no way diminish the importance of the experience of the past, especially the experience of such a great war as the Great Patriotic War war for us. The whole point is to take advantage of this experience for finding a creative, scientific approach, taking into account new political conditions and the changing ways of waging war."

It is important to generalize the experience of the military cooperation of the armies of the socialist countries, to develop ways for further improving the forms and methods of military cooperation, and to conduct combat operations through joint efforts. In this matter it is very important to establish closer contact and regular communications among the scientific agencies of the armies of the socialist states, primarily within the framework of the Warsaw Pact military organization. It is also important to generalize the experience in developing armies of liberated states and the experience of the struggle of peace-loving nations against imperialist oppression. It is also important to study forms and methods of cooperation of peace-loving forces in the struggle against imperialist aggressors.

Necessary conditions and important bases for further development of Soviet military science and for an authentically scientific approach to resolving all of the problems of military organizational development are profound study of the Leninist theoretical legacy and mastery of the methodology of Marxism-Leninism. It is also very important to make it clear that in our time military science embraces all spheres of the military field without exception and requires the combined efforts of leaders, scientists and specialists from all areas and also the active participation in scientific work of commanders and chiefs, staffs and political organs at all echelons.

PROBLEMS OF WAR AND PEACE AND THE WORLD REVOLUTIONARY PROCESS
(Military Problems in the Theory of Scientific Communism)

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Many social sciences deal with problems of war and peace. Relying on the conclusions of philosophy and political economics, scientific communism analyzes the sociopolitical aspects of the aforementioned problems and evaluates these phenomena from the point of view of their influence on the resolution of basic problems of the proletarian movement -- the revolutionary change from capitalism to socialism. These are the initial positions from which K. Marx, F. Engels, and V. I. Lenin considered problems of war and peace. These problems have now acquired special importance and occupy one of the leading places in the theoretical and practical work of the CPSU and fraternal parties. The 24th CPSU Congress devoted a great deal of attention to them.

Under modern conditions, problems of war and peace are primarily problems of revealing the reasons and sources of danger of war and possibilities and ways of avoiding another world war, establishing lasting peace, putting an end to local wars unleashed by the imperialists, and not allowing them to break out in the future. Resolving these problems in practice ensures more favorable conditions for the development of the world revolutionary process and for the progress of mankind.

Imperialism -- The Source of the Danger of War

In revealing the sources of the threat of another world war, scientific communism proceeds from the idea that war as a social phenomenon issues from certain social conditions. The system whereby man exploits man and the system whereby man destroys man are typical features of the exploitative social structure. V. I. Lenin emphasized, "War is not a random happening, not a 'sin'..., but an inevitable stage of capitalism, a form of capitalist life which is as predictable as is peace." (Polnoye sobraniye sochineniy [Complete Collection of Works], Volume 26, p 41).¹ This is especially clearly manifested under imperialism when all of the contradictions of capitalism become exacerbated to the limit.

When expounding on Leninist teachings about imperialism, the 24th CPSU Congress pointed out that in our day imperialism has become considerably more aggressive. The increase in imperialist aggressiveness is brought about primarily because of certain strides made in the economies of the major imperialist powers. The scientific and technical achievements and the development of governmental monopolistic capitalism have brought about certain progress in the economies of the capitalist countries, especially in the more industrially developed ones. At the same time there is a

process of concentration of production and capital, they are becoming much more centralized, the financial oligarchy is continuing to grow, supermonopolies called conglomerates are being formed, and more capital is being taken from the major countries of imperialism and invested in other countries of the capitalist world. Imperialism defends these capital investments through the most varied actions, including military. K. Marx's reminder that capitalists are prepared to stoop to any crime in order to obtain as much profit as possible sounds very timely.

During the postwar years in the imperialist countries, especially in the U.S. where there is greater concentration of monopolistic capital, because of the dominance of monopolies there has been formed the so-called military industrial complex, a coalescence of military, industrial and bank, and political circles which is dangerous for all mankind. This military industrial complex exerts ever increasing influence on U.S. domestic and foreign policy. It confirms the statement by V.I. Lenin that the deepest roots and the domestic and foreign policy are determined by economic interests, by the economic situation of the ruling classes.

The increase in imperialist aggression is associated with the steadily developing process of changing over from capitalism to socialism. Under these conditions imperialists are increasing hatred for the forces of progress and are trying, through military means, to regain their lost position. From what has been said it follows that: the danger of armed conflict between capitalism and socialism arises not because of the antagonism between the two opposing world systems but because of the aggressive nature of imperialism.

The 24th CPSU Congress produced new proof of the unchanging reactionary and aggressive nature of imperialism, primarily American imperialism.

Militant circles of American imperialists are laying a claim to world dominance. The Soviet Union and the other socialist countries are the main obstacles standing in the way of realizing these hopes. Therefore, the extremely aggressive policy of U.S. imperialists and their allies is directed primarily against the socialist states -- the basis and bulwark of the entire world revolutionary movement.

Since further development of the workers' and national liberation movements involves new revolutionary uprisings on the part of the workers, imperialists do not stop at attempts to unleash new "local" wars against peoples who are taking up arms in defense of their own national and social liberation. But "small" wars carry the danger of growing into a world war.

Bourgeois propaganda serves the goal of preparing for another war. It is generally thought in the U.S. and other imperialist countries that a

nuclear missile war between the two systems is unavoidable, that if general peace is possible it is only on the basis of "atomic equilibrium," and so forth.

The American professor Dinerstein notes that in U.S. policy "the dominant general goal is to hold back communism" through intervention. He writes, "in this case intervention is defined as direct and indirect use of force by the United States in order to avoid...a communist takeover of power in one country or another or to overthrow a communist regime which is already established."²

In order to disguise their aggressive policy, imperialist ideologists, politicians and propagandists slander Marxism-Leninism, asserting that it considers war to be a means for establishing socialism and communism. The spreading of false rumors of the "Soviet threat" has become in the U.S. a constituent part of the mechanism for implementing their aggressive plans...

The military and political blocs created by the imperialists, the dense network of American military bases throughout the countries of the capitalist world, and the increasing arms race serve their aggressive purposes.

Underestimation of the threat of war is impermissible, a policy constructed on denials of the danger of war is criminal. But these are the very anti-Leninist positions regarding questions of war and peace which are held by "left" extremist elements like Maoists, Trotskyites, and others. Their attitude toward problems of war and peace comes close to the position of the more reactionary imperialist circles.

Possibilities and Ways of Avoiding War

One cannot approach problems of war and peace simply from the point of view of the development of capitalism. It is necessary to take into account that there is no economic basis for the idea that war between socialist and capitalist states is unavoidable since war is inherent only in the nature of capitalism.

The primary reason for wars among capitalist states ensues from the law discovered by V. I. Lenin concerning the inequality of the economic and political development of these countries. The effect of this law has given rise to the inevitability of wars under capitalism. But this law, while continuing to be in effect within the framework of the capitalist system, does not extend to the system of socialism. Moreover, and this is the main thing, it is now not capitalism, but the world system of socialism in conjunction with other revolutionary forces that determines the basic direction of world social development. These forces also exert an ever increasing influence on the resolution of the problems of war and peace in favor of peace. Under modern conditions, the possibility of war

coming from imperialism is opposed by another real possibility -- that of avoiding war. Resolving this most urgent problem of the present -- whether there will be another world war or not -- depends on the realistic alignment of the forces for peace and the forces for war and on the power of the forces for peace, their organization and decisiveness, and their persistence in the struggle against the aggressive intentions of imperialism.

In the modern age wars are waged by people. Therefore, the imperialists and other reactionary forces cannot prepare for or wage war without recruiting the broad masses of workers into the service of the army or without supplying the armed forces with everything necessary to conduct combat activities. This means that if the military policy of the imperialists is in opposition to the combined power of all the peace-loving forces it is possible to force the aggressors to abandon their plans. This is the conclusion the CPSU and other Marxist-Leninist parties came to.

Powerful revolutionary forces, the world system of socialism and the international workers' and national liberation movements are now standing in opposition to the aggressive policy of imperialism and for peace and security of peoples. The militant union of these basic revolutionary forces continues to become stronger and deeper.

Heading the peoples' struggle for peace, the communists are guided by Leninist concepts of war, peace and revolution.

In the first place, pacifism is alien to them. They are not against wars in general. Communists support just wars, that is, wars being conducted by the working class and the workers in the name of freedom and social progress. But they are decisively against wars that are unjust and predatory.

In the second place, communists have never considered war to be a necessary condition for the changeover from capitalism to socialism. V. I. Lenin said, "war is generally in opposition to the goals of the party of communists." (Volume 36, p 470)

Marxist-Leninists decisively reject the views of "leftist" extremists like the Maoists who theorize about "two possibilities of world war" and preach that war is the only way of overthrowing imperialism, that half of mankind can be destroyed in the name of the victory of the world revolution.

In the third place, communists are sure that the victory of socialism and communism on a worldwide scale can also be achieved without world war. The objective laws of social development will inevitably lead to the victory of the socialist revolution in those countries where it has not yet succeeded. The problem of replacing capitalism with socialism is resolved primarily

through the struggle of the class forces within each country of the capitalist world. As we know, V. I. Lenin was strongly against the "leftist communists" who suggested in the spring of 1918 that there be a "revolutionary war" to "urge on" the revolution in the West.

As for the present antagonism between the two world systems, capitalism and socialism, Marxist-Leninists are convinced that any social system must prove its superiority not through the force of arms, but by competing in the production of material goods and the creation of cultural values and satisfying the needs of the people as completely as possible. Marxist-Leninists are convinced that in this competition the final victory will be on the side of socialism which has undeniable advantages over capitalism.

In the fourth place, communists consider peace to be a necessary condition for the further progress of mankind and an important prerequisite for resolving the basic political, social and national problems of the world revolutionary process.

The people developing socialism and communism need peace. Socialism, communism and peace are inseparable. In a socialist society there are neither economic reasons for war nor social forces interested in it. Under peaceful conditions the countries of socialism can more successfully resolve the problems of developing productive forces and raising the culture and well-being of their peoples. "With every month of peace we become ten times stronger," said V. I. Lenin (Volume 41, p 139)

A peaceful situation contributes to the intensification of the class struggle in capitalist countries, creates favorable conditions for changing the alignment of class forces in favor of the workers, and helps keep the capitalist states from using more reactionary methods in fighting against progressive forces.

Only under conditions of peace and all-round international cooperation can one resolve the problem of economic progress for developing countries and the problem of strengthening their national independence. Under conditions of peace there are more favorable possibilities for noncapitalist development of liberated countries and reinforcement of the progressive regimes in their struggle against the imperialist policy of neocolonialism.

This is why communists consider the struggle for peace against imperialist aggressors to be an integral part of the world revolutionary process and one of the ways leading to its complete triumph.

The world system of socialism, and mainly the greatest socialist power, the USSR, is the major anti-war force. This is where the basic material, political, ideological and military means serving the interests of the peace and security of peoples are concentrated.

Generalizing historical experience the 24th CPSU Congress pointed out that the world system of socialism is making the basic contribution to resolving such vitally important problems as avoiding another world war. The CPSU and the Soviet state, defending the cause of peace in close cooperation with the fraternal countries of socialism and with the ardent support of many millions of people, deserve an enormous amount of credit for sparing mankind the horrors of a world war for already more than a quarter of a century.

Further strengthening the unity and solidarity of the world system of socialism and increasing its economic and military power are the most important areas of the struggle of the CPSU and other fraternal parties for avoiding war. This idea is clearly expressed in the documents of the 24th CPSU Congress. The congress emphasized forcefully that the successes of the Soviet people in creating a material and technical base for communism, implementing a program of economic, sociopolitical and spiritual development of our country, and strengthening its defense capabilities contribute to further change in the alignment of forces in the world arena in favor of socialism and fill the hearts of the people with confidence in the triumph of the cause of social progress and peace.

The workers' movement in countries of the capitalist world is a powerful anti-war force. The working class is the main opponent of imperialism and its aggressive policy. The founders of scientific communism saw in the proletariat the decisive force capable of ensuring peace on earth. K. Marx wrote, "...The union of workers of all countries will finally eradicate all wars." (K. Marx and F. Engels, Sochineniya (Works), Volume 17, p 5)

A special role in the maintenance of peace belongs to the working class of the aggressive imperialist states. Whether or not the imperialists will succeed in this great evil against mankind depends to a considerable degree on the scope of the class struggle in these countries.

Anti-war feelings of the working class and its allies are taking up an ever greater place in the growing wave of class uprisings in capitalist countries. The anti-war movement in the citadel of world imperialism, the USA, has increased in scope recently.

The camp of reaction and war is being subjected to ever greater attacks also from the forces which have arisen within the national liberation struggle, primarily from independent, anti-imperialistic states. In many countries the struggle for national liberation has practically grown into a struggle against exploitation, both feudal and capitalistic.

A very large group of countries with socialist orientation have appeared in Asia and Africa. This weakens the economic, political, and military-

strategic positions of international imperialism and makes it more difficult to implement the policy of war and colonial brigandage.

The CPSU and the fraternal parties consider it their international duty to render all-round assistance to liberated peoples and consider this assistance to be one of the areas in the struggle for social progress and peace.

The extensive movement of proponents of peace is a real force against war in capitalist countries. Among the participants of this movement are many representatives and organizations of the bourgeoisie who hold positions of bourgeois pacifism. Communists understand very well that this is limited, that it ignores the real sources of military danger, that it is indecisive in censuring imperialist aggression, and that the views on ways of avoiding war are diffuse and abstract. But they think it necessary and expedient to establish contact with pacifist elements in the overall movement for peace despite the difference in views on essential questions of social development.

Moreover, communists are decisively against pacifist attitudes among the ranks of the revolutionary forces, who must take up arms against imperialist aggressors in order to defend their conquests.

War cannot be spontaneously excluded from the life of society. Avoiding it involves an active struggle against the military threat to broad segments of the people in all countries of the world and the three basic sources of the world revolutionary movement. Communists are conducting an unrelenting struggle to combine all peace-loving forces into a single anti-imperialist, anti-war front and to organize joint uprisings of its participants against the aggressive policy of imperialism. "In order to put an end to the criminal activities of imperialism, which can bring even greater disasters down upon mankind, the working class, the democratic and the revolutionary forces and peoples must join together in joint action," emphasizes the document of the International Conference of Communist and Workers' Parties in 1969. "To curb the aggressors, to spare mankind of imperialism is the mission which has fallen to the lot of the working class and all anti-imperialist forces waging the struggle for peace, democracy, national independence and socialism."

The 24th CPSU Congress played an important role in resolving this problem. This work was shared by 102 delegations of communist and workers' parties and national democratic and leftist socialist parties from 91 countries of the world. Speaking at the congress, foreign representatives unanimously approved the line of the CPSU for increasing the power of the USSR, considering it to be the Soviet people's contribution to the cause of peace and social progress. They expressed the fervent desire of their peoples for peace and emphasized the need for solidarity and unity of actions of

peace-loving forces. The 24th Congress of our party proceeded under the motto of further consolidation of these forces in order to fight against imperialism.

The Alternative to War. A Realistic Program of Peace

An enormous role in the struggle for maintaining and consolidating the peace and avoiding another war is played by the foreign political activity of the Soviet state and other socialist countries. It is based on two Leninist principles: the principle of proletarian socialist internationalism in relations with each other and with workers of the capitalist world and the principle of peaceful coexistence of states with differing socio-economic structures in relations with bourgeois countries. These principles are effective simultaneously and in combination with each other. They have a clearly expressed anti-war direction.

Anti-communist ideologists and reformists try to sow distrust toward the foreign policy of the socialist countries and falsely assert that the declarations of peace and peaceful coexistence are merely a tactical device of communists in order to rally forces and, through war, to carry out a world revolution, that internationalism and peaceful coexistence are incompatible, and so forth.

Maoists, Trotskyites and other "ultra-leftists" deny the class nature of the principle of peaceful coexistence and call it "revisionistic" because it is supposed to symbolize a denial of the class struggle, and so forth. Sometimes the Chinese government also makes the following kind of statement: "We are striving for peaceful coexistence of countries with differing social structures." But this government has not abandoned its positions of "urging on" the revolution through war, opposes the peace-loving policy of the Soviet Union and other socialist countries, and interferes with the peoples' struggle for peace and for avoiding a world war.

When advancing and substantiating the idea of peaceful coexistence of states with different socio-economic structures, V. I. Lenin proceeded from the idea that the world socialist revolution is not a one-time act but a total historical epoch of transition from capitalism to socialism during the course of which "socialist and capitalist states will exist side by side." (Volume 39, p 197)

But the opposing social structures of the coexisting states inevitably presupposes a struggle between them. Therefore, it is possible to have both peaceful and nonpeaceful coexistence. V. I. Lenin comprehensively substantiated the need for peaceful coexistence of socialist and capitalist countries. He proceeded from the fact that mutual interests arising from the existence of a world market and a world economy make this necessary. (Volume 44, pp 304, 305)

Developing this Leninist idea further, the CPSU and the fraternal parties consider the present-day alignment of class forces in the world arena and the possible consequences of a world nuclear missile war.

Communists emphasize that peaceful coexistence is the only reasonable alternative to war. "Peaceful coexistence of socialist and capitalist states is an objective necessity for the development of human society. War cannot and should not serve as a means for resolving international disagreements. Peaceful coexistence or a catastrophic war -- this is the only way history presents the problem," it is written in the CPSU Program.

Opponents of peaceful coexistence try to find contradictions between the faithfulness to this principle asserted by Marxist-Leninist parties and the announcement of the support of communists for all revolutionary and national liberation movements. They say that the policy of cooperation is incompatible with the idea of the inevitable victory of socialism over capitalism on a worldwide scale. Bourgeois ideologists agree to view peaceful coexistence as a continuation of the status quo, that is, of the situation which now exists in the world. They think that peaceful coexistence precludes a class struggle and that communists must guarantee the inviolability of the capitalist system in places where it now exists while revolutionary forces must forever refrain from fighting for revolutionary restructuring of socio-economic relations. For instance, the American sociologist R. Allen in his book entitled Peace or Peaceful Coexistence? quite openly says about this: "...what is yours, is yours, and what is ours, is ours."³ At the same time defenders of capitalism preach theories of "ideological peace," "peaceful coexistence of ideologies," and so forth.

When spreading such views, bourgeois propagandists intentionally mix up two problems: the problem of relations among sovereign states with opposing social structures and the problem of the internal development of countries of the capitalist world and the relations among various social and class forces within this world. Peaceful coexistence of capitalist and socialist states is a specific form of the class struggle between the proletariat and the bourgeoisie in the international arena. It is an economic, political and ideological struggle, but not military. This principle in no way advocates maintaining the social and political status quo. It does not extend to class antagonistic relations within imperialist states, to the relations among oppressed and oppressors, among colonizers and victims of colonial oppression, or to the area of ideology. In its struggle for liberation, the working class and the masses of the workers have the right to apply all means of struggle, including armed means.

Peaceful coexistence of states with differing social structures is a bilateral process and to establish and support it depends not only on the

socialist states. As experience shows, imperialist powers try in all ways to obstruct the establishment of peaceful relations between socialist and capitalist countries.

But, as the 24th CPSU Congress noted, despite the opposition of proponents of aggression and war, this principle has turned into a real force of international development. The overwhelming majority of the states supports peaceful coexistence. On the basis of this principle the Soviet Union is developing active and multifaceted relations with countries of the capitalist system, thus contributing to maintaining and consolidating peace and avoiding war.

In the struggle for achieving these goals the Soviet Union and other socialist countries rely on their own steadily growing economic, political, and military power as well as on the support of the peoples of the entire world. They take advantage of the interest of some capitalist states and bourgeois circles in political and especially in economic ties with socialist countries, and also of the contradictions among imperialists, which keep them from joining together for aggressive purposes and unleashing war.

Taking into account the major aspects of the international situation, the 24th CPSU Congress advanced a well-developed program in the struggle for peace, security of peoples and social progress. Along with the fraternal countries of socialism and other peace-loving states, the CPSU proposes to attain the elimination of the hotbeds of wars in Southeast Asia and in the Near East and to give an immediate rebuff to any act of aggression. It must become a law of international life to refrain from using force and threats for resolving controversial issues.

The security of Europe, on whose territory imperialists have twice unleashed world wars, requires that the results of World War II be finally recognized and that measures be taken for organizing collective security. The 24th Congress confirmed the statement expressed jointly by countries participating in the defensive Warsaw Pact that they are ready to simultaneously annul this pact and the NATO bloc or, as a first step, to eliminate their military organizations.

It is necessary to conclude agreements forbidding means of mass destruction -- nuclear, chemical and bacteriological weapons, and to have a cessation of all testing of nuclear weapons, including underground, and to promote the creation of non-nuclear zones. The Soviet Union is in favor of nuclear disarmament and, to this end, favors holding a conference of the five nuclear powers -- the USSR, the USA, the PRC, France and England.

The CPSU proposes that the struggle for halting the arms race be stepped up, that foreign military bases be eliminated, that measures be worked out

for reducing the probability of an accidental outbreak of war, and that agreements be made on curtailing military expenditures, primarily by the large states.

The remaining colonial regimes threaten the cause of peace. It is necessary to fully implement the U.N. decision concerning elimination of colonialism, this disgraceful remnant of the past. Manifestations of racism and apartheid must be subjected to censure and boycott.

The Soviet Union proposes that the practice of opposition of forces and development of military power be replaced by mutually advantageous cooperation among states in order to resolve through joint efforts such problems as preserving the natural environment, utilizing power and other natural resources, wiping out the more dangerous diseases, conquering space and the world oceans, and so forth.

This great program in the struggle for peace was advanced by the 24th Congress of our party and is shared by the entire communist movement. It met with lively response in the hearts of the peoples of the countries of socialism and all progressive people on earth. It was given a high rating and ardent approval by the Assembly of the World Council for Peace which took place in May of this year in Budapest and drew up documents directed at further expansion of the struggle of peoples for peace.

The military power of socialism is an important factor in maintaining and consolidating peace and ensuring international security. This is based on the fact that the struggle between socialism and capitalism is developing according to the laws of the class struggle and, in the final analysis, the side which prevails will be the one which has the greater material power, including military power. This usually dictates the forms of the struggle as well.

The way the present contradiction between the two world systems will be resolved depends on the alignment of these forces, primarily the military. It is typical of imperialism to try to resolve all social contradictions through extreme means, the force of arms. And if it turns out to be militarily stronger than socialism, it can unleash a war. But the nature of socialism is such that it strives to resolve the basic contradictions of our age through peaceful means, on the basis of peaceful coexistence of socialist and capitalist states. And, while the Soviet Union has taken up arms in the past and the USSR and other socialist states are now concerned about strengthening their military power, the imperialists have made and are making this necessary. While the imperialist powers, especially the U.S., take advantage of their military machine to implement the anti-peoples policy "from a position of force," the military organization of the Soviet Union and the other socialist states serves other purposes.

In the first place, during peacetime it is a basic means of defending from imperialism the peaceful labor of peoples constructing socialism and communism, a means of keeping imperialist aggressors in check. It is well known that when American imperialism had its atomic weapons and considered its dominance of the world secure, the Soviet Union deprived it of the atomic monopoly. This created a new strategic situation in the world. Imperialism can no longer unleash a world war without threatening its own existence. The understanding of this situation has a sobering effect on certain imperialist circles.

In the second place, during a war, if the imperialists should still unleash one, the armed forces of socialism will play a decisive role in defeating the aggressors. This conviction is based on the superiority of socialism and its military organization over capitalism and its military machine.

The Soviet Armed Forces are the offspring of the Soviet people and their Communist Party. Their power and invincibility lie in the might of the socialist social and state structure and in the party leadership.

The 24th CPSU Congress devoted a great deal of attention to strengthening the defensive power of the Soviet Union and the fraternal countries. It was noted that during the last five-year plan the CPSU and the Soviet state did a great deal to ensure that the defense capability of our country was solid on all of its levels and in all of its areas. The congress gave a high rating to the state of the Soviet Armed Forces, their combat efficiency and combat readiness. Taking into account the increased aggressiveness of imperialism and the threat it engenders to the peace and security of peoples, the congress directed the party and all Soviet people toward further strengthening of the defense capabilities of our country. In the congress resolution on the Accountability Report of the CPSU Central Committee it states that the all-round increase in the defensive power of our homeland and the education of the Soviet people in the spirit of high vigilance and constant readiness to defend the great conquests of socialism must continue to be one of the most important tasks of the party and the people.

The resolution of this problem is complex and it includes primarily measures directed at all-round improvement of the entire system of the military organization of the Soviet Union on the basis of successes in communist construction. Our party and government show daily concern for steadily increasing the military power and combat readiness of the Armed Forces which make up the nucleus and the core of the country's military organization. The work of such specific state elements of the system of military organizations as agencies of state security and the militia are constantly being improved. The work of the USSR Civil Defense, whose main function is to defend the population and industrial and other objects from enemy

weapons of mass attack, is being raised to a new level. The Voluntary Society for Assistance to the Army, Air Force, and Navy (DOSAAF) is making an even larger contribution to strengthening the defense capabilities of the homeland. In countries where socialism reigns, the multifaceted military matters involve all the people and herein lies a source of their success.

The Soviet Union and the other countries of socialism are organizing collective defense of the cooperative group of socialist countries. The Organization of the Warsaw Pact serves these purposes. In recent years, the CPSU and the fraternal parties have collectively developed and implemented a number of measures for strengthening and improving the military organization of the Warsaw Pact. The 24th CPSU Congress emphasized that the armed forces of the allied states are maintaining a high level of preparedness and are a reliable guarantee of the peaceful labor of the fraternal peoples. They serve the cause of ensuring European security and peace in the entire world.

FOOTNOTES

1. Henceforth only the volume and page will be given when referring to the complete collection of works by V. I. Lenin.
2. Quoted from the book V. I. Lenin i Sovetskaya vneshnaya politika (V. I. Lenin and Soviet Foreign Policy) International Relations Publishing House, 1969, p 16.
3. Quoted from the book Sotsiologicheskiye problemy mezhdunarodnykh otnosheniy (Sociological Problems in International Relations), Nauka Publishing House, 1970, p 49.

THE CHARACTER AND BASIC PRINCIPLES OF MILITARY SCIENCE RESEARCH

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Comprehensive study of military operations with the aim of thorough disclosure of their essence and content, and elaboration of the scientific theory of their preparation and conduct constitute fundamental areas of military scientific investigation.

Experience indicates that the direct investigation of military operations is not only the most important but also the most complex matter. Basic difficulties in this area are due to the following causes.

First of all, these operations cannot be reproduced in peacetime, due to which in the investigation there is no possibility of natural observation of the various processes involved, nor are there actual conditions for comprehensive verification of obtained results and conclusions drawn on the basis of these results.

In the second place, military operations are unlike any other known phenomena in nature and society. Therefore one cannot select their analogues. The sole way to investigate combat operations is analysis of their physical and mathematical models, during the construction of which subjective errors are inevitable.

Thirdly, military operations constitute extremely complex and contradictory processes, which possess a great many specific aspects, links and relations, which it is practically impossible to take into full consideration in simulation. The above-enumerated difficulties are overcome in some measure with a scientific approach to definition of the subject and aims of the investigation and proper observance of the principles of military scientific research. Thus, in order to increase the effectiveness of military scientific research it is necessary constantly to improve the methodological base, to analyze changes in the character, principles and methods of research.

In spite of its specific features, military scientific research does not differ essentially from research in any other area of science; they pursue a common objective -- scientifically to solve a specific problem, to obtain new scientific results: objectively valid data on a given object, phenomenon, substantiated conclusions which expand our knowledge of the object of investigation.

Each proposition in every investigation should be proven with experimental data, facts, and where this is impossible with quantitative evidence, by utilizing all the means of dialectical logic.

It is the job of a scientific investigation to reply not only to the questions what and how but also why this way and not another. This presupposes not simply a statement of facts and description of processes and phenomena but also an examination, clarification, analysis, and thorough substantiation of propositions advanced.

The process of military scientific research includes: statement of the problem and defining of aims, thorough study of the object of investigation, collection of materials, gathering of factual data, their systematization, synthesis, analysis, elaboration of specific ideas, scientific hypotheses, their verification, computations, etc.

"Research," wrote Marx, "should involve thorough familiarization with the material, analysis of various forms of development of material, and a tracing of their internal links. Only after this work has been completed can real movement be properly portrayed" (K. Marks and F. Engel's: Soch. [Writings], Vol. 23, page 21).

The character of a scientific investigation, its specific features, traits, methods and techniques are determined first and foremost by the object of investigation.

Since many matters pertaining to military scientific research are closely linked with the social and applied sciences, the methods and techniques of these sciences are extensively utilized in examining these problems.¹ A characteristic feature of investigation of such problems is the fact that in the majority of cases the obtained results can be verified by performing an appropriate experiment, and this is very important for military practice.

"...Through his practical activities," wrote Lenin, "man proves the objective correctness of his ideas, concepts, knowledge, and science" (Poln. Sobr. Soch. [Complete Works], Volume 29, page 173).

The results of studies of military operations cannot be verified with these methods. In studying these operations military science cannot utilize experiments conducted under artificially created conditions. Full, comprehensive verification of the correctness of the theses and conclusions of military science is possible only during the course of war. "Military theory," noted Mar SU A. A. Grechko, "differs from other sciences in that war alone is in the final analysis its practical laboratory. The problems advanced by theory in the prewar period can be finally resolved only on actual fields of battle."²

At the same time the achieved level of development of Soviet military science in recent years indicates that existing scientific research methods make it possible with sufficient reliability to solve the problems facing military science in the area of cognition of modern military operations. Marxist-Leninist methodology, which points out and illuminates the paths of investigation in all fields of knowledge, serves as the basis for correct solution of the fundamental problems of military science.

Military scientific research constitutes a creative process of cognition of the new. As any cognition process, it encompasses a number of stages, is subordinated to corresponding laws, takes place in forms inherent to it, and is carried out with the aid of specific methods and mental operations.

Deliberate, not spontaneous utilization of these laws, forms and methods constitutes a guarantee of attainment of productive results. Of prime significance in this respect is correct solution of the methodological problems facing investigators.

The following are general methodological problems which the investigator encounters in studying military operations of modern warfare: to what area of the art of warfare does the knowledge which must be obtained as a result of the investigation pertain? What types of military operations should be selected as object of investigation? What goals should be achieved as a result of the investigation? What knowledge should be obtained in the process of investigation? What problems must be solved in order to obtain the requisite knowledge? Under what conditions should the investigation be conducted? A correct solution to all these problems as an aggregate ensures a scientific approach to the problem of research, guarantees selection of the most feasible area of investigation and in general form determines its content. In other words correct solution to these problems ensures the creation of a scientific basis of investigating military operations in each specific instance.

All the above-enumerated problems are closely interconnected. Solution of each depends in large measure on how the others are resolved in a given specific case. Let us examine some of them and possible approaches to their solution, bearing in mind that each problem in the organization and conduct of research can pertain to problems of object of investigation, ways and means of conducting the investigation proper.

Problems of object of investigation are connected first and foremost with elucidation of the following questions: what does the object comprise and under what conditions is it to be studied? For a correct response to these questions it is necessary to select the type of object, to provide it with the requisite interpretation and to determine, at least in general features, the potential or allowable degree of abstraction from secondary or less substantial factors and conclusions. The answers to these

questions are closely linked with the objects of investigation, the tasks which are to be performed, as well as the means of conducting the investigation. Thus problems of military operations (as the object of scientific investigation) should also be solved taking into consideration possibilities of subsequent solution to problems pertaining to means and methods of research.

Selection of type of military operation as object of a scientific study depends entirely on the purpose of the investigation. In studying problems of operational art the object of study may be the operation as a whole or any aspect of the operation. The choice of the operation, however, as object of investigation is only the first step. Immediately thereafter it is necessary to determine what is to be investigated: one type of operation, all types, or only certain types. If the object of investigation is study of characteristic features (aspects) inherent in all operations, then all known types of operations or the majority of known types can be selected as object of investigation. If some one aspect of the operation, inherent only in one type of operation, is to be studied, then in this case only this type of operation should be selected as object of investigation. Finally, if the object of investigation is study of the area of tactics, then as object of cognition one can select the engagement, the attack, any type or any one aspect of combat operations.

Interpretation (description, analysis, conclusions) of the selected type of combat operation as object of investigation also depends on the aim of the investigation. In this case, however, in addition to objective one considers the specific problems which must be solved during the course of the investigation, as well as the ways of conducting the study.

In general military operations are interpreted in different ways. When necessary they can be presented in the form of complex processes of change, controlled systems, static systems, elements of more complex systems, in the form of specific sociopolitical phenomena, etc. It is essential to note thereby that in any case various approaches to interpretations of military operations are possible. Military operations are also disclosed in different ways, in relation to this, as a result of which various aspects of military operations become amenable to scientific investigation. Precisely this circumstance opens up considerable opportunities for elucidating the object of investigation and makes it possible to take into consideration the objectives, problems and means of conducting the investigation.

For example, if the aim of the investigation is to reveal the objective laws and patterns of the course and outcome of military operations, evidently the best success can be achieved by examining the object of investigation in the process of change. In this case the basic means of

investigation may be solutions of differential equations, and the tasks -- formulation of these equations.³ If the aim of the investigation is to select study of the influence of various factors and conditions on the course and outcome of military operations, it is expedient to present these operations in the form of a complex controlled system. With this interpretation of the object, problems solved during the course of investigation may boil down to elaboration, for example, of a mathematical model of this system, and ways of conducting the investigation -- to study of the behavior of system characteristics, in relation to specified conditions and numerical values of system parameters.

Analysis of the problem of object of investigation and possible approaches to its solution indicates that, in the first place, one cannot count on research success if the object is incorrectly defined at the very outset and, in the second place, it cannot be resolved if it is divorced from the aims, tasks, means and conditions of investigation. It is also important to emphasize that in examining the methodological problem pertaining to elucidating the object of investigation, one can trace how the theses of materialist dialectics, in close combination with the theses of military science, are transformed into a scientific method of solving complex specific problems which may arise in the process of investigating military operations.

The problems of research objective include elucidation of the nature of knowledge which is to be acquired as a result of studying the object. The nature of knowledge is determined to a greater degree by the reasons impelling one to engage in the research. General reasons for research can be the following: the necessity of bringing accumulated knowledge into conformity with the content of modern military operations and a study of these operations with the objective of more thorough disclosure of their essence and content. From a methodological standpoint it is important to determine these causes more precisely. In the former case (for bringing accumulated knowledge into conformity with the content of modern military operations) the reasons motivating the research may be the need to study the missions and role of new types of weapons and combat equipment and their influence on the character and content of combat operations, with the objective of determining the performance characteristics of a weapon under development consideration. In the latter case (for more profound study of the essence and content of modern military operations) the reasons may be the need to obtain new and deeper knowledge about these operations, with the objective of ensuring successful solution to the problems of military scientific research, improvement of theory and creation of a theory backlog in the area of military science.

It is easy to note that elucidation of impelling reasons helps reveal the nature of the aim of investigating modern military operations. Consequently,

elucidation of causes is the first methodological question to which a response must be given in solving the problem of the objectives of this research.

A second methodological question is determination of the specific aim of the investigation. The necessity for this is dictated by the inexhaustible quantity of concrete aims each reason may harbor. For example, in investigating military operations in order to obtain new and more complete knowledge on them, concrete research objectives can be: a) revelation and cognition of objective laws; b) revelation and cognition of the mechanism of effect of objective laws; c) influence of the role and significance of factors which determine the course and outcome of military operations; d) disclosure and cognition of the laws governing the course and outcome of military operations and elucidation of the basic conditions ensuring victory over the enemy, etc. The above-enumerated objectives do not exhaust all questions (which can be studied in investigating modern military operations), although they have not been formulated very concretely. If one endeavors to disclose these objectives more concretely, the idea of their relative inexhaustibility will become understandable, as the task of cognizing military operations is in practice inexhaustible.

Selection and formulation of specific research objectives is an extremely complex methodological problem, independent of the reasons impelling the investigation. This problem is most difficult to resolve when research is organized for the purpose of obtaining new knowledge unknown up to that point. In this case determination and formulation of concrete research objectives is particularly closely linked with the problem of the object of scientific investigation -- selection of an object, its interpretation and determination of the conditions of investigation. This is due to the fact that in all other cases, simultaneously with the origination of reasons for the investigation, its objectives can also be seen fairly clearly, while specific objectives are not usually apparent in organizing research for the acquisition of new knowledge. Therefore while in the former case one first specifies the research objective and then selects the object, subsequently determining the most suitable character of interpretation, in the latter instance one initially selects the object of investigation, provides a given interpretation, and then elucidates what specifically should be investigated in order to obtain new data.

For example, selecting one type of military operation as research object and interpreting it as a complex process of change, one can reveal the connections and relations characterizing any aspect of this process, determining the degree of its importance for cognition of the process itself, and subsequently formulating in final form the specific research objectives. If one views military operations as complex controlled systems, they can be broken down into elements, and each investigated separately.

Separation is possible down to the simplest elements contained in the system, down to individual connections and relations between these elements.

Analysis of the methodological problem of research objective, just as the problem of object of investigation, shows their close interrelationship and the fact that in all cases one should take into account in solving each of them the conditions of the possibility of solving the other.

After determining the objective, object of investigation and character of its interpretation, one must settle the question of the method of reproducing the object, the means and sequence of its investigation.

Simulation constitutes the basic method of reproducing modern military operations when studying such operations. Selection of model should in each specific instance correspond to the research objectives and nature of interpretation of the object. In order to reveal the essence of methodological problems arising in the given instance one can employ mathematical models, which are presently coming into increasing use.

The next methodological step will be determination of what such a model is to describe: a selected type of military operation in its entirety, only separate parts, individual connections and relations, or something else. One then determines what mathematical methods can be utilized for the model, possible approaches toward its construction and the most expedient construction scheme.

Finally, the most important methodological stage is the formulation of the research task. After this the target type of military operation (at least in general form) should be described by a function or number of functions, in order that one can proceed to construction of the model and practical elaboration of the mathematical apparatus for solving problems in the process of investigation.

In analysis of methods of reproduction, means and sequence of studying the object, the points of departure were the objective, the object proper and the character of its interpretation, which graphically shows their direct dependence on the nature of solution of these problems. This does not exclude, however, the possibility of an inverse relationship as well. For example, in selecting method of reproduction of the objects of investigation, and particularly in constructing a model, it may be necessary to refine or change the interpretation of the object or to refine (supplement) the research objectives. This is usually caused by the fact that during construction of the model it is determined that military science does not possess the requisite knowledge for this. Then this fact itself can serve as a mark for determining the additional research objectives.

One of the most important methodological problems is determination of the fundamental conditions of conducting the investigation. For this it is necessary to determine the requisite or allowable degree of detail and synthesis of individual aspects (connections, relations, parts of the object); to determine the requisite or allowable degree of abstraction of this object from various connections, relations and conditions which could hinder the process of investigation; to determine the parameters and criteria which should or can be utilized during the course of investigation, etc.

The conditions of conducting the investigation are determined, refined and considered at all stages of the solution of methodological problems. They must be definitively formulated, however, simultaneously with formulation of the problem. Subsequently these conditions can be detailed and refined in elaborating models of military operations being studied.

Computers constitute an important means of any military scientific research and verification of research results under present-day conditions. Computers make it possible to examine problems under conditions more or less approximating real conditions, taking into consideration the dynamics of change in manpower and resources, to repeat an experiment several times, and to obtain optimal values of the quantities being examined, with minimal material outlays. But knowledge acquired as a result of such an investigation requires practical verification by other methods. Field exercises and maneuvers can be very beneficial in this respect. The conduct of exercises and maneuvers, however, away from the conditions of an actual combat situation, without the involvement of a real adversary, also involves various conventions and simplifications. Therefore only certain aspects of military operations can be fairly reliably verified in the course of exercises and maneuvers.

An important role in verifying research results is played by the experience of past wars. In military scientific research it is utilized primarily for elucidating the patterns and trends in development of methods and forms of warfare, as well as study of those aspects which have not lost their practical value under present-day conditions and which enable one to draw lessons for the future.

In examining the character and methods of conducting military operations one must simultaneously take into account a great many important factors as an aggregate (political conditions and economic potential, combat properties of diversified weapons, protection, troop movement, morale-combat qualities of personnel, organizational forms of friendly and enemy troops, combat readiness, effect of weapons under higher commanders, degree of enemy opposition, potential losses, the time element, nature of terrain, weather and other conditions), and this dictates the necessity of employing

the resources of other sciences in military affairs. Therefore the military scientist should keep current on scientific and technological advances and should correctly determine the potential for their application in military affairs.

In elaboration of problems of tactics, operational art, and strategy the investigator proceeds from available manpower and equipment. At the same time he must take into consideration prospects in weapons development, change in personnel and, taking all this into consideration, must predict changes in methods of warfare. One cannot, however, depart from reality. Otherwise the art of war will inevitably become transformed into unrealistic dreaming and adventurism. On the other hand the military investigator should not only consider available resources and proceed from them, but he must in turn determine and specify paths of further development of military resources and capabilities, scientifically substantiating each and every argument.

Soviet military science is successfully solving the problems facing it, skillfully applying Marxist-Leninist methodology and strictly observing the basic principles of military scientific research: Communist party-mindedness, objectivity, bold statement and innovative solution to the most vital problems, the historical approach, and scientific prediction.

Communist party-mindedness is an essential condition for genuinely scientific solution to the problems of military theory and practice. It demands that military researchers in all their efforts be guided by Marxism-Leninism, wage a vigorous struggle for implementation of Communist Party and Soviet government policy, that they consistently express their position toward the class enemies of the proletariat and relentlessly oppose all manifestations of bourgeois ideology. To observe the principle of Communist party-mindedness in military science means to observe total objectivity, scientific principles of investigation, and to elaborate problems of military theory on the basis of the most painstaking and comprehensive consideration and analysis of all objective data and factors.

Bold statement and innovative solution to the most vital scientific problems under present-day conditions is of extremely great importance. Scientific and technological advances as well as rapid arms development demand that the military scientist boldly state current and vital problems, draw fundamentally new conclusions and vigorously reject old, obsolete solutions to various problems.

Karl Marx wrote that mankind always sets for itself "only such tasks as it can perform, since with a closer examination it always becomes evident that a task proper arises only when the material conditions for its solution are already available or at least are in the process of becoming available" (Marks and Engel's, Soch., Vol. 13, page 7).

In order to pioneer new paths in science, the military scientist must possess boldness of thought, decisiveness, the courage to speak out in opposition to that which has become obsolete and fails to meet today's demands. Fear of openly expressing one's opinion, servility toward authorities, and the restatement of known truths leads to stagnation and makes research superficial and feeble.

The military technological revolution is being accompanied by a radical breakdown of old concepts, theories, and principles. In sweeping away the old, however, one must at the same time bear in mind that its negation should be, as Lenin taught, not bare, empty, skeptical, but rather dialectical, as an element of communication, development, with the preservation and reworking of everything valuable which was accumulated at the preceding stage.

The historical approach is a universal principal of dialectical approach to reality in the process of its investigation. It obliges one to examine all phenomena of objective reality with consideration of their origination and development, in connection with concrete historical conditions.

The historical approach to investigation of contemporary problems of military affairs makes it possible to reveal the patterns and trends of development of various phenomena and the factors determining them; it restrains one from groundless fantasy, from extremes; it introduces into theoretical reasoning the element of practical experience and furnishes a wealth of material for scientific conclusions. Thus the experience of the past becomes one of the means of cognizing the present and future and assists in successfully solving the problems of the present day.

The principle of historicism is hostile to and directed against all dogmatism. It demands that one examine each and every phenomenon and event not from a static position, not in a frozen state, but rather in a state of development, interaction, internal linkage. The historical approach to phenomena being investigated serves as an important means of conclusiveness, convincingness, substantiation of advanced theoretical assumptions. History and theory are closely and inseparably linked. The theory of a subject organically includes its history as well. Therefore discovery of the history, that is development of an object is part of the task of scientific research.

Scientific prediction is based on the dialectical nature of the objective world, in which everything develops and always represents a unity of the past, present, and future.

"...If one examines any societal phenomenon in the process of its development," stated Lenin, "it will always contain remnants of the past, the

foundations of the present and rudiments of the future" (Poln. Sobr. Soch., Vol. 1, page 181). Consequently, prediction is an essential element of cognition and constitutes one of the main tasks of scientific research. Prediction is the crown of all scientific efforts.

Scientific prediction is inherent in every science at a certain level of its development and plays an enormous role in all spheres of human activity. It is also essential in military science, since without elucidation of the prospects of development of military affairs, without determination of the character and methods of warfare in a future war, it is impossible correctly to resolve the problems of the nation's defense and consequently the problems of armed forces organizational development.

Principal demands on military scientific prediction are maximum scientific precision and thorough substantiation. Fulfillment of these demands depends on the level of professional competence of the investigator, his military knowledge, the degree of his mastery of materialist dialectics, depth of research of the problem and ability to rely on knowledge of all those scientific resources which have been elaborated by past military theory and practice.

Scientific prediction is always connected with certain assumptions on the nature of phenomena and their causes, that is with scientific hypotheses. The majority of scientific theories appeared initially in the form of hypotheses. Of course one cannot call every assumption or guess a hypothesis. A hypothesis is called scientific because it constitutes a scientifically substantiated assumption, containing specific arguments. In military scientific research the hypothesis represents as it were an initial stage, on the basis of which further research is conducted. Advanced assumptions are subjected to practical testing and verification. If a hypothesis conflicts with observational and experimental data, it is rejected. A hypothesis which has received practical confirmation becomes scientific theory.

An important role in scientific prediction is played by creative imagination. Lenin pointed out that imagination is a quality of the highest value, and it is foolish to negate its role in the most rigorous science. As a rule imagination focuses on the future. It is based on present knowledge, on a specific level of technological development, and promotes the development of creative thought, arouses interest in cognizing the future, and makes it possible to advance fruitful ideas and valuable scientific hypotheses.

The results of military scientific research find expression in various forms: field manuals, military regulations, instruction manuals, textbooks, monographs and other printed materials. The rapid publication of military

scientific research makes it possible to disseminate research results rapidly to the officer community, ensures the practical adoption of latest advances and serves the cause of increasing the defense capability and combat readiness of the Armed Forces. The results of military scientific research should not be "archived."

Lenin demanded "that science for us not remain a dead letter or fad expression (but unfortunately this is frequently the case), that science indeed enter our flesh and blood, transforming into a genuine component element of our life" (Poln. Sobr. Soch., Vol. 45, page 391). This demand applies in full measure to military science.

The Communist Party and Soviet government are creating all the conditions necessary for the development of science in general and military science in particular. Scientists in this country are surrounded by care and attention. It is the direct duty of military scientists to conduct all military scientific research on a high quality level and in conformity with the time allotted in the research schedule.

FOOTNOTES

1. For a discussion of the general demands imposed on forms of development of scientific knowledge, see Voyennaya Mysl', No 12, 1970, pp 15-24.
2. Voyenno-Istoricheskiy Zhurnal, No 2, 1961, page 4.
3. It is planned to publish a series of articles in this journal in the near future, containing a detailed discussion of contemporary analytical and statistical methods of military scientific research -- Ed. Note.

METHODS OF MILITARY SCIENCE

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Every science has its own subject of investigation and employs, in addition to general methodology, its own particular methods, with the aid of which it obtains a system of specified knowledge comprising its content. Method is the soul of science; the degree of accuracy and veracity of theoretical principles depends on the quality of methods employed.

The object of investigation, its essence, content and specific features determine the methods of investigation; a complex, many-faceted phenomenon requires the employment of many different methods, which make it possible fully to reveal the specific features of each of its aspects and facets. It is obvious that genuinely scientific conclusions and theoretical principles can be obtained only when conducting an investigation on the basis of Marxist-Leninist methodology. Materialist, Marxian dialectics constitute a universal method of cognition.

War is an extraordinarily complex phenomenon, for the investigation of which many methods are essential, including historical-analytical, logical, mathematical and experimental, based on dialectical methodology. Since the state of war is determined primarily by the conduct of warfare, that is the employment of weapons, investigation of preparations for and the waging of military operations is of prime significance in military science.

In studying the problems of military science one encounters a large number of factors which are of various effect under different situation conditions. One of the features of war as an object of cognition is the lack of opportunity to conduct a full-fledged experiment in order to verify the correctness of various theoretical tenets or conclusions.

Theory of military science is constructed on the basis of a careful, objective analysis of the conditions of the political situation, the state of the economy and morale, geographic conditions, correlation of forces and many other factors affecting armed forces organizational development and the conduct of military operations. Of great importance is the nature of the input data, which decisively determine the results obtained. Correct, objectively existing input data and premises as well as analysis of the conditions and capabilities of the opposing sides in war, which is flawless from the standpoint of logic, ensure obtaining scientifically substantiated theoretical principles of military science.

Science is based on facts. "Precise facts, undisputed facts," wrote Lenin, "this is what is particularly... essential if one intends seriously to gain an understanding of a complex and difficult problem... But how should facts be gathered? How should their relations and interrelations be determined? In the area of societal phenomena there is no more widespread and flimsy technique than the snatching of individual minor facts, a game of examples. To select examples in general is no difficult task, but it has no value whatsoever, or purely negative value, since the importance lies entirely in the specific historical situation of individual, separate instances. If one takes facts as a connected aggregate, they are not only 'stubborn things' but certainly demonstrating, proving things as well. If minor facts are taken totally out of context, if they are detached and arbitrary, they are nothing but a toy at best" (Poln. Sobr. Soch. [Complete Works], Volume 30, page 350).

Engels emphasized that the dialectical method is an analog of reality (K. Marks and F. Engel's: Soch. [Works], Volume 20, page 367). It includes the principles of objectivity and comprehensiveness of examination of objects and phenomena in the process of their origination and development, the laws of mutual transition of quantitative and qualitative changes, unity and struggle of opposites and negation of negation.

There exists an objective dialectic in nature and society, including war. The laws of materialist dialectics, reflecting objective processes and relationships between them, constitute the basis of man's scientific, purposeful activity in all areas of life, including military. The task of the investigator is to apply dialectical methodology consciously as an instrument of cognition for revealing the laws and principles of war and elaboration of the theoretical tenets of military science.

Marxian dialectics teaches us that all phenomena in nature and society exist in specified relations with one another. To study any phenomenon, including war and military operations, means first and foremost revealing its principal direct and indirect relations.

In studying war it is extremely important to reveal the interrelationships among the basic factors and laws which predetermine the character, course and outcome of war, the types, methods and forms of conduct of military operations.

Essential directly in the course of military operations is a comprehensive assessment of the objectively-forming strategic and operational situation in decision-making and organization of combat operations on any scale.

Victory in war depends to a large degree on correct situation assessment, sober evaluation of the correlation of forces actually existing at the

moment a given decision is made, as well as troop morale and supply. The demand of Marxian dialectic methodology that one examine all events and actions in their interrelations lies at the basis of an important principle of military science -- interaction. Examination of the phenomena of war in their interrelationships makes it possible, basing oneself on the past and present, to elucidate development trends and to predict the future, employing various methods.

Marxist methodology demands comprehensive examination of phenomena. Lenin stated: "In order really to know an object it is necessary to grasp it, to study all its aspects, all its direct and indirect relationships. We shall never fully achieve this, but the demand of comprehensiveness will protect us from errors and from sterility" (Poln. Sobr. Soch., Volume 42, page 290).

Just as in the process of scientific investigation, in decision-making in war it is important to select from a mass of events that which is the most important, that which is determining. The ability to select the main thing and to separate it from the secondary is a valuable quality of the investigator.

As has already been noted, the main element in war is combat, that is the employment of weapons by the belligerents in order to achieve political aims. In the conduct of military operations this demand results in the principle of concentration of main effort in the major area. In the process of armed forces organizational development, depending on the specific conditions of the political and strategic situation, with harmonious development there emerges a main, decisive branch of the armed forces. For example, during the Great Patriotic War the ground forces were the principal service. Under present-day conditions, as a result of the military technological revolution, the missile troops have become the most important. This process is inevitable in the future as well.

At the basis of investigation of development of forces, means and methods of conducting military operations is Marxist doctrine on development, which demands that one examine all events in the process of the movement and dying off of the old and the birth of the new. The dialectical method demands in a study of the phenomena of war that one examine them comprehensively, from the standpoint of interrelationships, in the process of development, transition from old to new quality, from the simple to the complex, from the lower to the higher, war as a process of struggle between two sides.

The character and methods of waging wars in the era of deepening of the general crisis of capitalism, the genesis, confirmation and victory of socialism, cannot be the same as in the era of the slave-owning and feudal

society. The development of nuclear weapons together with new means of delivery and control has led to a radical change in the principles of conduct of military operations. New weapons demand new methods and forms of waging military operations.

The process of change in the methods and forms of military operations is of an objective character; therefore the task of military science is prompt determination of the most advantageous, optimal method of action under given historical conditions.

The dialectical law of transition of quantity to quality reveals how changes occur in the processes of war. Employment of powerful weapons on a small scale does not lead to radical changes in the character and methods of waging war. Only massive employment of qualitatively new weapons produces totally new features of war and new principles of conducting military operations -- quantitative changes lead to qualitative changes. In examining military problems it is important to determine what qualitative changes are dictated by quantitative changes in personnel, weapons and other means.

Of particular importance for military science is the law of unity and the struggle of opposites. War is a process of struggle between two sides; if there is no armed struggle between two sides, pursuing the aim of achieving specific political objectives, there is no war. In the process of war one side, having seized the strategic initiative, advances, while the other side defends; the actions of one side produce a reaction by the other. Strictly speaking, military actions of any nature and scale occur only in those instances when they are conducted by both sides; it is incorrect to refer to military actions when only one side participates. There can be no attack without defense, and vice versa. The two fundamental types of military operations -- attack and defense, in the unified process of struggle constitute concrete expression of the law of unity and the struggle of opposites.

Finally, one of the important laws of dialectics, of great importance for military science, is the law of negation of negation, which demands in investigating the phenomena of war that one proceed from the fact that in the process of historical development the old is always replaced by the new, the more progressive.

In order correctly to comprehend the phenomena of war it is necessary to understand their development tendencies. In studying the experience of the past and the conditions of the present, one should predict the future. The ability to find the rudiments of the new in the past and correctly to determine development prospects constitutes a most important demand of military science. Here it is easy on the one hand to remain captive to the

past and on the other hand incorrectly to assess the ability of the new to present the desired as the actual.

A study of the history of the development of methods of conducting military operations indicates that sometimes old, obsolete methods have been reborn on a new, higher social and technological basis. It is the task of military science -- proceeding from the demands of the law of negation of negation, correctly to determine the development prospects of forces, means and methods of conducting military operations.

In addition to methodology of a general nature, military science possesses its own specific methods of investigating an object, corresponding to its specific character. One of these methods is study and synthesis of the practical experience of past wars.

Marxist dialectics demands a concrete-historical approach in investigating any societal phenomena. Lenin stated: "The most reliable in the matter of social science and the most essential thing in order genuinely to acquire the habit of correctly approaching this matter and avoiding becoming lost in a mass of trivia or the vast diversity of competing opinions -- the most important thing in order to approach this question from a scientific standpoint, is not to forget the fundamental importance of the historical relationship, to view each matter from the standpoint of how a given phenomenon originated in history, how this phenomenon passed through the main stages in its development, and to view from the standpoint of this development what the given item has now become" (Póln. Sobr. Soch., Volume 39, page 67). A concrete-historical approach to facts and the ability to assess them in conformity with those conditions under which these facts exist is an important demand of military science.

The historical-analytical method is one of the main methods of military science, and study of the experience of past wars is one of the principal sources nourishing military science.

This kind of examination makes it possible to abstract the principles of armed forces organizational development and the conduct of military operations and to demonstrate the development of military science in relation to development of the qualities of personnel and weapons, evoked by the growth of productive resources and revolutionary transformations in society. One must bear in mind thereby, however, that the practical experience of past wars is in many cases unable to serve as a guide for future wars, since the conditions for the genesis and conduct of wars almost never repeat. Each war takes place under its own special conditions; the experience of one cannot be mechanically transferred to another. Therefore military science selects from the experience of history only that which remains valid for a long period of time and which can find application in the future.

Valuable scientific materials can also be obtained as a result of studying the experience of contemporary small-scale, local wars, which flare up from time to time in various parts of the world as a result of the predatory policy of the ruling circles of the imperialist states which, in addition to the endeavor to achieve their economic and political aims by means of war, view battlefields as unique proving grounds to test the performance of new weapons and weapon utilization techniques.

One important method of scientific investigation is the experiment, which is employed in testing weapon and military equipment performance under proving ground conditions. In this case, however, only their technical performance characteristics can be verified, which differ substantially from combat capabilities. As a rule the proving-ground capabilities of a weapon diminish severalfold under combat conditions, particularly due to enemy response activity.

A special form of experiment is the conduct of field exercises and command-staff games, in the process of which military operations of various scale are studied. Exercises and games promote development in personnel of skills in decision-making and conducting operations similar to those which will be potentially exercised in time of war. Of the greatest scientific value are bilateral exercises and war games whereby each side is guided by the views on the conduct of military operations prevailing in the armed forces of the depicted nations and coalitions. In this case a model is constructed which objectively portrays the actions of the sides.

Sometimes experience in operational and combat training is viewed as "practical activity" on the basis of which military science is created. This viewpoint is erroneous. In spite of the important role of exercises and games, they nevertheless do not constitute "practical war activities." The conditions created at field exercises only approximate a war situation, since there is lacking actual hostile activities.

The greater the degree to which exercises and games create actual conditions, the more valuable they are, but there will never be total approximation. Therefore experience in operational training can find reflection in military science only with full consideration of its inherent features, and particularly the influence of the subjective factor.

An equally important method of investigation employed by military science is logical-mathematical analysis. With the aid of the laws of logic and mathematics one investigates the conditions of waging war, the nature of operations of the belligerents at the beginning and during the course of war, and potential combat capabilities are compared, taking into consideration quantitative and qualitative estimates, with prediction of the most probable results of combat encounters and a specific group of

measures aimed at securing favorable conditions for friendly troops and unfavorable conditions for the enemy. By following the laws of logic it is possible correctly to state the aims of the investigation and to draw fairly well-substantiated conclusions. Logic provides methodological techniques which promote full and comprehensive investigation of many phenomena of war.

The validity of many scientific principles can be proven logically. The logical nature of evidence, conclusions and recommendations is essential for investigation to be scientific. Conclusions which do not proceed from the content of the investigated material are usually of no scientific value. In particular, of special importance for military science is the law of logic of sufficient grounds, which demands that every scientific thesis be proven.

Following of the demands of dialectical logic and the laws of formal logic constitutes one of the conditions of scientific character. On the basis of these demands, analysis and synthesis, abstraction and generalization of the investigated material are effected in examining the events of war, in order to obtain new scientific concepts and conclusions.

Extremely beneficial to military science are scientific conferences and discussions, during the conduct of which various problems are thoroughly and comprehensively discussed. These methods, based on confrontation of opinions in the search for the truth, are an important motive force of science. During the course of discussion opponents, striving to prove the correctness of their view, present all kinds of evidence and substantiation in defense of their advanced theses; on the other hand they make every effort to demonstrate the weak points of their opponent. The expression "the truth is born in debate" confirms the value of the mechanism of debate.

Conferences and scientific debates determine well-founded scientific theses, which subsequently are either adopted as official views or are experimentally verified. A fundamental criterion for their scientific character is the degree of substantiation, convincingness and proof.

Today there is occurring a unique "mathematization" of all branches of science, including military. According to Paul Lafarge, Karl Marx believed that "science will achieve perfection when it succeeds in utilizing mathematics."¹

At the present time, in connection with the extensive adoption of new weapons by armed forces, one can hardly exaggerate the importance of

mathematical methods and techniques in determining the effectiveness of weapons in the engagement or operation, anticipated losses in men and equipment, in seeking methods of operation, etc.

Through its methods and means mathematics can express as it were the "skeleton" of the processes of war, revealing and providing mathematical links among them. This applies not only to those phenomena of war which have already occurred experimentally, but also to future processes which may occur under actual war conditions.

Mathematical methods enable one to predict the results and consequences of military operations and to elaborate theories of new phenomena of war. Military scientific theories constitute the result of an aggregate of efforts in the study of historical experience, logical structures and the employment of mathematics.

An important role thereby is played by mathematical simulation. Usually "a model is defined as a mentally-pictured or materially-realized system which, depicting or reproducing the object of investigation, is capable of replacing it in such a manner that its study furnishes us with new information on that object."²

A mathematical model, although not fully reflecting an entire real process or phenomenon, nevertheless, and this is very important, makes it possible to encompass complex systems of operations in their entirety, to study many variants of solution of a given military problem and to help select the optimal variant.

Modern computers make it possible very quickly to verify and compare the results of many operation variants. The accuracy of calculations is determined primarily by the accuracy of the input information, which describes the actual conditions of problem solution. Mathematics helps tie together various processes which comprise component parts of war.

Finally, automation of control of military collectives and weapons systems is becoming increasingly widespread in connection with the military technological revolution. Under these conditions the role and significance of mathematics in elaboration of scientific military theory becomes enhanced to an even greater degree. Many areas of mathematics are directly utilized in military science. In particular, relationships in random phenomena are studied by theory of probability, which takes into consideration the presence of unknown conditions and random elements.

The correlation method of analysis can be employed in studying complex forms of interrelations, whereby interrelations among processes of war are analyzed.

Games theory methods are also in widespread use in military affairs, that is the theory which deals with examination of conflict situations in which two sides participate, pursuing opposed aims. This theory assists the command of the sides in making optimal decisions under specific situation conditions, taking into account potential enemy actions.

Of considerable importance are methods of operations research theory, which is a rapidly developing science. It is extensively employed in various areas of human activity, including military affairs. A broadening of the scale of military operations, increasing complexity of their character, diminished time available for decision-making and conducting military operations demand a broad range of research and elaboration of optimal action variants within a limited period of time.

The task of investigating military operations reduces to determination of optimal decisions in the area of armed forces organizational development and the conduct of military operations, corresponding to a maximum degree to those conditions which prevail during war, taking into account fully or partly unknown data on the enemy, and making it possible to find the optimal variant, that is to solve problems with the existence of factors of undetermined character. Different criteria of the optimum are examined in arriving at a final decision, and that variant is selected which is substantiated to the greatest degree not only mathematically but with other methods as well.

Statistical methods, which help investigate quantitative aspects and forms of processes under investigation, find extensive application in military scientific research.

In assessing the qualitative aspect of phenomena one resorts to methods employed in the applied sciences, and in the area of investigating the human aspect, morale and psychological features of man under war conditions -- to the methods of sociology, psychology, education science, etc.

Summarizing the above, we conclude that military science utilizes a great quantity, an entire system of diversified methods of investigation, which in their aggregate dictate a high degree of substantiation and scientific character of its theoretical principles.

FOOTNOTES

1. Vospominaniya o Markse i Engel'se (Recollections of Marx and Engels), Gospolitizdat, 1956, page 66.
2. V. A. Shtoff: Modelirovaniye i filosofiya (Simulation and Philosophy), Izd-vo Nauka, 1966, page 19.

THE INFLUENCE OF PHYSICAL-GEOGRAPHIC CONDITIONS ON THE CONDUCT OF
COMBAT OPERATIONS

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Natural, physical-geographic conditions constitute an extremely important objective situation element which exerts considerable influence on the forms and methods of combat operations, utilization of combat equipment, as well as supply and medical care of troops in the field. This influence is particularly strong in sparsely-inhabited and inaccessible regions -- mountains, desert, tropical and arctic regions. We shall discuss this in somewhat greater detail.

I.

The degree of influence of mountainous terrain on troop combat operations depends primarily on the elevation of the mountains, population density and road network. Less influence is exerted by low (less than 1000 meters in elevation) and well-populated mountain areas. They do not represent very rugged terrain, contain comparatively few inaccessible points and areas subject to avalanches and rockfalls. One encounters here more frequently than in high and middle-elevation mountains broad (15-60 km) and easy troop corridors and good roads. For these reasons low-elevation mountains in most cases permit the conduct of operations by large forces, with utilization of large quantities of diversified combat equipment.

The experience of history shows that exaggeration of the difficulties of operations in mountain regions of this type can lead to serious consequences. On the eve of World War II the Anglo-French command, drawing up military operations plans, believed that the Ardennes Hills (mean elevation approximately 500-600 m) would make the conduct of combat operations by a large force difficult. On this basis they concluded that the German army could deploy its main forces only to the north of the Ardennes. In May 1940, however, the German command secretly concentrated and launched the main attack with Army Group A, totaling 45 divisions, including six panzer and three motorized divisions, right through the Ardennes Hills. The element of surprise and force superiority, as well as the clear, dry weather and consequent good off-road passability, enabled the German troops swiftly to penetrate the Allied defenses, to advance 100-130 km in 3 days, to cross the Maas in a hasty river-crossing operation and created favorable conditions for successful development of the offensive to the English Channel.¹

The conduct of combat operations in mountains, including low-elevation mountains, is also substantially determined by other natural factors as well -- weather, season, nature of vegetation and soil.

In December 1944-January 1945 the German command resolved to rout the Anglo-American troops in Belgium and Holland and to force the United States and Britain to agree to a separate peace with Nazi Germany. The main attack was also planned through the Ardennes, on approximately the same axis as the 1940 offensive. This axis was extremely favorable to the German troops from an operational standpoint. Three infantry divisions and one armored division, weakened in previous engagements, were defending in the Ardennes plateau region on a frontage of 120 km; here was also located the point of juncture between the U.S. Twelfth and British Twenty-First Army.² The German command, utilizing the wooded-hill Eifel region and taking advantage of bad weather (low, solid overcast), secretly concentrated in the Ardennes sector an army group (Sixth and Fifth Panzer Armies) totaling 22 divisions and 2 brigades. A superiority of manpower and weapons in this sector and a surprise attack enabled the German troops to penetrate Allied defenses and to advance to a depth of 30-40 km in the first 72 hours (16, 17, 18 December). The planned rate of advance, however, could not be maintained, primarily due to the adverse weather.

Impassible mud resulting from a thaw, followed by a snowfall, compelled the troops to conduct combat operations chiefly along highways. The rate of advance dropped substantially due to roadway icing, drifting snow, destruction of bridges by the enemy, as well as the steep grades and sharp turns. Traffic bottlenecks formed in many sectors, causing troops to pile up. On 24 December forward units of the 2nd Panzer Division of the Fifth Tank Army became stuck in the snow. This enabled the Allies, by means of stubborn defense of important road junctions, to pin down large German forces and simultaneously to shift their troops from sectors which were not under attack. When the weather cleared and Allied air power, which enjoyed air superiority, began delivering continuous air strikes on the troops jammed up on the roads, the German rate of advance became even slower.³

As we see, the same low-elevation mountains exerted varying effect on combat operations, depending on weather conditions.

Middle-elevation (up to 2000 meters) and particularly high mountains are incomparably more difficult for troops. They are distinguished by complex relief, the existence of extensive inaccessible areas, and a meager road network. The few roads which do exist run along narrow, long mountain gorges, through high (to 2000-2500 m and higher) passes, across rushing mountain torrents, and contain many steep switchback sections, bridges, culverts, retaining walls and stretches subject to avalanches and rockslides.

Landslides, avalanches and rockfalls occur as a result of vehicle traffic, artillery and sometimes even small arms fire. Particularly extensive destruction can be caused by the employment of nuclear weapons, as a result of which some areas may become inaccessible for troop operations.

Therefore in planning an offensive operation in mountains (particularly high and middle-elevation mountains), one determines first of all the potential results of employment of nuclear weapons. It may be that it is not always expedient to deliver nuclear strikes in mountain areas, particularly large warheads. One must also bear in mind that casualties caused by terrain collapse may be many times greater than those caused by the nuclear burst proper. On the basis of these features, U.S. Army field service regulations recommend, for example: "Under conditions where advancing troops are supported by nuclear weapons, small nuclear warheads should be employed, in order not to block routes of approach."⁴

In operations in middle-elevation and high mountains it is necessary carefully to determine distribution of the force and equipment among axes. As a rule the main effort is concentrated on the widest axes, containing the best roads and presenting less danger of destruction from terrain collapse. Only specially trained and equipped units will be able to advance along some routes. Gaps between operating large units will frequently stretch several dozen and hundreds of kilometers. In view of the fact that troops cannot count on fast support from neighboring axes or assistance from depth (reserves), forces along axes should be set up to be maximally independent in all respects. Combat formations can be in two or even in three echelons, but most frequently in a single echelon with the availability of strong reserves. This formation structure was typical in the Korean War.

It is difficult to establish high tactical densities in view of the above-listed features of middle-elevation and high mountains. For example, U.S. troops in Korea had only 50-60 guns and mortars and 10-15 tanks per km of frontage, even on the main axis of advance.⁵ The deficiency in artillery and tanks was usually compensated for by employing considerable air power. Aircraft were also extensively utilized to attack lines of communication and to drop airborne assault forces.

Airmobile troops can be extensively employed in mountain theaters. They can seize maintain passes and valleys, summits, bridges, road junctions, and can attack the enemy's flanks and rear. The employment of airmobile units and large units will diminish the dependence of troops on roads and will make it possible substantially to increase the pace of combat operations in mountainous areas.⁶ The employment of airmobile troops, however, is not always possible, due to rapidly-changing weather. Therefore specially-trained flanking detachments acquire great importance during

operations in mountains, particularly middle-elevation and high mountains. The availability of good cover and concealed approaches enables such detachments to penetrate deep into the enemy's rear, to seize key ground and to create favorable conditions for the advance of the main force. They can be particularly effective in surprise actions. In the Korean War the Korean and Chinese command assigned considerable forces to flanking detachments. These detachments would execute deep envelopment during hours of darkness or under poor weather conditions, which ensured the element of surprise and eliminated the possibility of enemy air attack.

In inaccessible areas specially equipped detachments operate on a wide frontage on all accessible axes, which makes it possible substantially to increase the rate of advance. As under normal conditions, the efforts of the attacking force are concentrated on the most important axes. This is due to the fact that defense in mountain terrain is usually established along separate, more accessible axes, with the main efforts of the defending force concentrated along the main roads. Therefore in the Korean War 60-80 percent of the men and equipment of the advancing Korean and Chinese forces were concentrated on the main axis of advance.⁷

At the same time the defending force should closely watch difficult-to-negotiate areas, for the adversary may penetrate the defense precisely in these sectors, advance on the lines of communication of the main forces and create a threat of encirclement. In 1942, for example, the 383rd Rifle Division was given the mission of defending a wide (24 km) strip of difficult terrain southwest of Maykop. This was considered an area of secondary importance. The Germans massed in this area, however, a main attack force commanded by General Lentz and established a threefold superiority in men and weapons.⁸ It was only thanks to the heroism of our troops that the enemy was prevented from penetrating deep into the division's rear.

The experience of the war demonstrates that in mountain areas, particularly forested terrain, it is impossible to close off all avenues of approach, since available forces are insufficient. Therefore when organizing defense in mountainous terrain it is important to determine key sectors on the most threatened axes: commanding heights, passes, bridges, road junctions -- and to establish at these sites main strong points, fortified for perimeter defense with an effective fire system, strong and diversified field fortifications. The war in Korea, for example, demonstrated that the most solid mountain defense was defense organized in the form of a system of strong points and centers of resistance with a two or three-tier arrangement of weapons emplacements, with trenches supplemented by tunnels with a protective earth layer 40-70 m thick. The average battalion defensive position on primary axes contained up to 1 kilometer of tunnels, 5 km of fighting trenches and 2-3 km of connecting trenches. This provided a

multiple-layer arrangement and high density of fire forward of the FEBA and gave the defense a high invulnerability factor. In spite of total air supremacy and superiority in tanks, the American troops were unable to penetrate such a system.⁹

II.

Considerable influence on the conduct of combat operations is exerted by the physical-geographic factors of desert areas, particularly surface configuration, soil and climate. Deserts are sparsely-populated, vast, predominantly flat regions with an arid climate. They are characterized by a severe deficiency or total lack of water, sparse vegetation, sharp fluctuations in temperature, constant winds, and a variety of soils.¹⁰

The exposed, plains nature of the terrain configuration substantially increases the threat to troops in case of the employment of nuclear weapons. The blast wave, unimpeded by large natural obstacles, propagates great distances; nuclear bursts produce an enormous column of radioactive dust, which results in an increase in the contamination area. Protection of troops against weapons of mass destruction in desert areas, constitutes an exceptionally complex problem.

In deserts there are usually no advantageous natural lines which can be utilized to establish a defense. The open nature of the terrain and an absence of natural cover and built-up areas present difficulties to concealed maneuver, troop camouflage, orientation and target designation, as well as the selection of fire (launch) positions and position area survey. At the same time the flat, treeless terrain possesses certain advantages. For example, stony deserts and clay ground in the dry season favor the employment of highly-mobile motorized rifle and tank forces and facilitate maneuver. Deserts offer unlimited opportunities for utilization of aircraft at ground level.

Desert regions are distinguished by a severe climate. In summer air temperature climbs to 40-50°C during the day. Exposure of troops to the hot desert sun with a limited water supply results in a considerable loss of combat efficiency and in addition makes weapons and combat equipment utilization difficult.

A substantial threat to troops in desert areas is presented by sandstorms, during which roads, fire positions, airfields and all man-made structures become buried in sand. Dust and sand penetrate everywhere, accelerate wear on combat equipment and transport vehicles, and in some cases put them out of commission. Troop combat operations can temporarily come to a complete halt. For example, on 20 September 1941, during an Italian offensive against the British (in the Libyan Desert), a violent sandstorm raged over the battle area, forcing the Italians to halt the advance.¹¹

A limited number of water sources and their poor yield introduce serious difficulties to troop water supply. In connection with this fact towns, oases and wells are of vital importance. Combat operations take place precisely around these sites, as is confirmed by war experience. For example, combat operations in the deserts of East Africa during Italy's Ethiopian campaign (1935-1936) were conducted only along roads, watercourses and at oases. Selection of axes of advance was dictated by the location of oases containing a sufficient number of wells.¹² In World War II the British operated against the Germans and Italians along a narrow frontage (100-120 km), in the most heavily-populated strip along Africa's Mediterranean coast.¹³

The difficulty of obtaining water in deserts, lying at a depth of 100-150 meters and more, and the necessity of delivering water to the troops demand the organization of special water supply subunits as well as the establishment of above-normal stocks of water in the units. Field pipelines may be employed for the delivery of water. The British and Italians attempted to solve the water supply problem in this manner in North Africa in 1940-1942. Water lines ran a total of 110-260 km.¹⁴

In desert regions troop operations on the most accessible axes will acquire a high degree of independence. For example, based on the experience of the war against Japan in 1945, the composition of troops operating on separate, independent axes would range from a division to a corps. The gaps between divisions (Seventeenth Army of the Transbaikal Front) ranged from 50 to 90 km along the frontage. Large units of the horse cavalry-mechanized group advancing on the Kalgan axis operated at a distance of up to 200 km laterally from the main forces.¹⁵

The existence of exposed flanks and enormous gaps in the defense enables advancing troops to employ maneuver on the largest scale; action by enveloping detachments are particularly effective under these conditions. There can occur deep envelopments, close envelopments, breakthroughs, as well as combined actions from the front with simultaneous attacks on the flanks and rear of the defending force. In November 1942, for example, in a semidesert area west of Astrakhan' the German Khaltutinskaya force was crushed by the Twenty-Eighth Army as a result of a skillful deep envelopment and attack into the enemy's flanks and rear.¹⁶

Also possible is the necessity of an attack with penetration of a fortified defense, which is most probable when the flanks of the defending force are secured by areas of difficult terrain, as was the case when the Germans were in a defensive configuration in North Africa (1942), where their defensive positions were flanked on the north by the Mediterranean and on the south by the shifting sands of the Libyan Desert.¹⁷

In combined operations great significance is acquired by skillful selection of axes both of the main attack and for operations by forces attacking the flanks and rear of a defending force. War experience confirms the effectiveness of this form of maneuver. Characteristic in particular are the operations of the Soviet-Mongolian troops against the Japanese-Manchurian force on the Khalkhin-Gol River in 1939, where rifle troops operated on a central axis, while powerful mobile horse cavalry and armored groups were established on their flanks, attacking into the rear along converging axes.¹⁸

An important demand in conducting a desert offensive is the achievement of a high rate of advance, which is dictated primarily by the necessity of quickly depriving the adversary of bases supporting him in the defended area.

Defense in deserts, as is indicated by the experience of the last war and exercises conducted in recent years by the CENTO and SEATO command, is based on holding advantageous positions covering oases, road junctions and other areas (points) of terrain offering easy supply of water and materiel. Due to the highly-scattered nature of such areas and their isolated position, defense is organized with large gaps between strong points.

The principal feature of defense in desert regions is the extremely uneven distribution of men and equipment both parallel and perpendicular to the front. At the same time enormous expanses of desert offer the possibility of extensive maneuver in defense at the expense of giving up ground, since seizure of ground per se in many cases offers no advantage to the advancing force.

III.

No less difficult for combat operations are jungles -- tropical rain forests which cover large areas in Southeast Asia, Central Africa, and South America.

Predominantly hilly and mountainous terrain, covered by dense tropical forests and an intricate network of rivers, a hot, humid climate, high rainfall, limited visibility, difficulty of movement -- the above constitutes a general description of these areas.

Vegetation and climate exert the greatest influence on jungle combat. Tropical forests contain almost no hard-surface roads, while existing jungle roads and trails are not always suited for motor transport, due to their narrowness and the meager load capacity of bridges, while off roads the jungle terrain is extremely difficult. Small stream beds frequently substitute for roads, since it is easier to wade through shallow water than

to hack one's way through the dense jungle. All these factors limit capability to conduct offensive operations at a rapid pace, make coordinated action more difficult, practically rule out the employment of tanks, and frequently artillery as well, and lead to the necessity of extensive utilization of combat and transport rotary-wing and fixed-wing aircraft.

Tropical rain forests possess excellent protective properties against both nuclear and conventional weapons. The extreme dampness rules out the possibility of major forest fires. The experience of the war in Vietnam indicates that even with the aid of napalm, U.S. troops were able to initiate only limited fires.

Climatic conditions exert great influence on jungle combat. Combat operations are particularly difficult during the rainy season, when heavy downpours occur daily. As a result vast areas become flooded and impassable. For this reason ground troops combat operations are virtually impossible for a period of several months, while air activities are extremely restricted due to the low overcast conditions.

Experience indicates that troops designated for jungle operations should be organized into several small units (company-battalion), armed with light infantry weapons and specially equipped. Only along main roads can these units be reinforced by artillery and tanks. For example, during the Burma Campaign (1942-1944) the Japanese troops operated only in small units (up to company in size).¹⁹ The U.S. command in South Vietnam employs "light" infantry divisions and detached infantry brigades, minus tank battalions, for jungle operations. In addition, the specific features of jungle areas have compelled the Americans to create a type of large unit which is new in both organizational structure and equipment -- the airmobile division.²⁰ Thus only mobile, lightly-armed troops can conduct successful jungle warfare.

Special tactics are also employed. On the basis of U.S. experience, jungle combat operations are of a brief, focal nature. Fighting can flare up at different times and in different areas. As a rule there will be no continuous contact between the sides; there is no continuous frontage, FEBA, or lateral points of contact.

IV.

The Arctic constitutes one of the most difficult areas for the conduct of combat operations. Characteristic of most of the Arctic region is a harsh climate, the predominance of low-lying plains with broad expanses of muskeg, dotted with lakes, containing numerous rivers and practically no

roads. Mountains encountered in this region also constitute difficult terrain: their slopes are extremely rugged, and strewn with boulders and rock fragments. The northern part of the Arctic contains tundra, and the southern -- forest-tundra.

These features make the conduct of combat operations extremely difficult. First of all they inhibit maneuver, particularly in summer, excluding any possibility of off-road travel by wheeled combat and transport vehicles without the construction of cross-country routes. In winter, when the muskeg, lakes and rivers freeze and can be utilized for laying temporary roads and constructing airstrips, the Arctic becomes somewhat more accessible. Troop movements and combat operations, however, are seriously restricted in the winter months by snow cover, which reaches a depth of several meters in terrain pockets and on lee slopes. Conditions for movement across virgin snow improve somewhat at the end of winter and the beginning of spring, when the snow becomes packed and the ice crust remains sufficiently strong. But even during this period drifting snow and blizzards are possible, which can seriously hamper movement not only across snow but along roads as well.

Nuclear weapons in the Arctic will apparently be just as effective as in the desert, since the flat, exposed terrain, particularly in the tundra, possesses practically no protective properties. The substantial confinement of troops to roads, an abundance of narrow corridors between lakes and various defiles, the possibility of ice destruction over large expanses as well as the forming of destruction barriers facilitate the selection of targets for nuclear strikes. Employment of nuclear weapons in Arctic regions, however, will in almost all cases be hampered by complex physical-geographic conditions.

The difficult terrain makes it necessary to conduct offensive operations in the Arctic primarily along existing roads. An offensive operation will be predominantly in the form of frontal attacks, since off-road deep and close envelopments require considerable time and can be carried out only by specially trained units and large units without heavy weapons. Frequently flanking units must engage without artillery and tank support. The role and importance of maneuver of air power, missile fire and, along the coast, naval gunfire support become much greater in connection with this.

And yet the experience of the troops of the Karelian Front, who mounted the Petsamo-Kirkenes Operation in 1944, persuasively demonstrated the great effectiveness of deep and close envelopments. In this operation facilitated-organization units had large units successfully executed off-road deep envelopments, mounting surprise attacks on the enemy's flanks and rear. An instructive example of this is the 4-day deep envelopment maneuver across tundra executed by the CXXVI Light Rifle Corps,²¹ which

succeeded in cutting lines of communication in the enemy's rear, thus substantially predetermining the enemy's defeat and the capture of Petsamo.

Due to a poorly-developed road network and difficulty of access to areas off roads, rates of advance in the Arctic are slower than in other areas offering particularly difficult natural conditions. For example, in the Petsamo-Kirkenes Operation the troops of the Fourteenth Army advanced at a rate of only 5-6 km per day during the first and second phases; the average daily rate of advance increased to 15 km during the third phase, when the enemy had expended his operational reserves and no prior-fortified defense lines were available.²²

Postwar experience indicates that march capability and consequently rate of advance in Arctic regions can be substantially increased when units and large units are equipped with all-terrain vehicles and other equipment with exceptional off-road capability. For example, at a U.S. field exercise code-named Polar Strike, held in Alaska in February 1965, a column of M-113 APC towing 105 mm howitzers covered a 175 kilometer stretch in 4 days, that is at a rate of approximately 44 km per day.²³

In the Arctic advancing troops, particularly flanking forces, require continuous air support to a greater extent than under normal conditions. In addition, due to the fact that at certain times in combat at enemy defense depth artillery falls behind, aircraft may become the sole means of providing close air support to attacking units. Air strikes against enemy troops, weapons and reserves will help maintain a high rate of advance.

It is believed that helicopters, which provide the capability of rapidly moving men and weapons to the most difficult-access areas, can become particularly effective for increasing troop mobility. In addition they can to a certain degree compensate for a lack of artillery and can offer fire support to infantry, which in turn will help increase the rate of advance. Helicopters in the Arctic also play an important role in organizing uninterrupted troop control.

Thus the employment of excellent off-road capability vehicles and aircraft gives combat in the Arctic a more dynamic and maneuver character.

Terrain impassibility in the majority of Arctic regions limits but does not totally eliminate the employment of heavy equipment -- tanks, missile launchers, artillery, etc. Tanks were first used in the Arctic by the Fourteenth Army in the Petsamo-Kirkenes Operation. This experience confirmed that under Arctic conditions²⁴ tanks can operate jointly with infantry, primarily along roads, in deep combat formations, but not massed. It is best to employ amphibious tanks during the summer months in flanking detachments and forces.

The highly-broken terrain of the Arctic is more favorable for organizing defense than offense. The experience of operations carried out in the Arctic during World War II indicates that defense was based on holding strong points and centers of resistance set up on commanding heights and advantageous lines cutting across accessible axes of advance. Strong points and centers of resistance would be fortified for a perimeter defense.

The great number of narrow corridors, rivers, defiles between lakes and bogs facilitate the employment of obstacles but greatly hamper fortification of fire positions, construction of shelters, command and observation posts, as well as road construction. The volume of work required for fortification purposes greatly exceeds that of analogous operations under normal conditions. At the same time much equipment cannot be used because of the ground's features (solid rock, boulders, permafrost). Therefore a large percentage of earth moving requires the use of explosives.

A serious obstacle to troop operations in the Arctic is presented by the abundance of rivers, lakes and bays (fjords), which presents increased demands on supplying units and large units with water-crossing equipment. First of all troops require an adequate quantity of self-propelled river-crossing equipment, particularly amphibious APC, both for carrying across personnel and light combat equipment and for carrying assault forces along lakes to the enemy's rear.

The harsh Arctic climate strongly affects personnel, combat equipment, weapons and in the final analysis the character of offensive and defensive operations. During a large part of the year the temperature does not rise above freezing, while in winter it ranges from -12 to -38°C . Strong moisture-laden winds blow year-round, with wind velocities in winter frequently as high as 20-30 m/sec.

In order to ensure high troop combat efficiency it is necessary to acclimatize personnel, to supply them with special clothing, warm, waterproof footwear, heated tents, as well as vitamin-enriched rations. Personnel should be drilled in operations under low-temperature conditions, should be trained in building simple shelters of snow and rock, should be familiar with measures to prevent frostbite and should be able to operate weapons and equipment under the difficult Arctic conditions.

Abundant snowfall, frequent blizzard conditions and low overcasts, which occur in the Arctic 200-300 days a year, greatly impede air activities, the conduct of radiation survey, terrain orientation, and observation. The wind impedes the utilization of protective gear as well as radiological decontamination and decontamination washdown of personnel and equipment.

Heavy blizzard conditions are accompanied by strong electrostatic interference, making short-wave radio communications difficult or impossible.

Ionospheric and geomagnetic disturbances accompanied by aurora borealis must be considered when organizing troop control in the Arctic. These phenomena can cause compass errors of up to 10-15°, which can result in a loss of bearings, with orientation made difficult under any circumstances by the monotony of terrain and poor visibility. Ionospheric and geomagnetic storms also impede the operation of short-wave radio sets, reducing their effective range. Therefore it is necessary to increase the effective output of radio transmitters and to change frequencies in the spring and fall, as well as at sunrise and sunset, when magnetic and ionospheric storms are most common. The most reliable radio equipment to use under Arctic conditions are vhf, uhf, and low frequency equipment.

Unusual conditions for military operations are also created by such specific phenomena as the polar day (150 days) and the polar night (up to 145 days). They disrupt the customary routine of daily activities and increase personnel tendency to tire. The polar day hinders camouflage, concealed deployment and movement of troops. The polar night promotes concealment and surprise, but there is also an increase in the effect of luminous radiation from nuclear bursts. According to figures published in the American press, damage to the eyes at night from luminous radiation produced by a 20 kiloton nuclear burst can occur at a range of up to 60 km. In order to maintain watch on the enemy during the polar night it is necessary to increase the number of observation posts and to make extensive use of radars and night-vision devices for terrain surveillance.

Thus the natural conditions prevailing in the regions we have discussed above are complex and strongly influence the conduct of combat operations. In organizing such operations it is essential very carefully to bear in mind the features of terrain, season, time of day, and climate, and to take steps to reduce their negative effect on personnel and combat equipment.

FOOTNOTES

1. Istoriya voyn i voyennogo iskusstva (History of Wars and the Art of Warfare), Voenizdat, 1970, pp 124-125.
2. Ibid., pp 373-374.
3. Wehrwissenschaftliche Rundschau, February 1970, pp 93-97.
4. U.S. Army Field Manual FM 100-5, Paragraph 183.

5. Lt Col P. Ya. Tsygankov: Kharakternyye cherty voyennogo iskusstva v lokal'nykh voynakh posle vtoroy mirovoy voyny (Characteristic Features of the Art of Warfare in Local Wars Since World War II), Izd. Voennoy akademii im. M. V. Frunze, 1970, page 27.
6. Military Review, July 1970, pp 57-62.
7. Tsygankov; op.cit., page 38.
8. Sbornik takticheskikh primerov po opytu otechestvennoy voyny (Collection of Tactical Illustrations from the Great Patriotic War), No 1, Voenizdat, 1943, page 25.
9. Voyna v Koreye. Voenno-istoricheskiy ocherk (The War in Korea. A Military Historical Essay), Voenizdat, 1959.
10. Deserts are divided into sandy, clay and stony deserts. Deserts cover a total of approximately 20 million square kilometers, or 15 percent of the earth's land surface.
11. Trudy akademii. Sb. No 21 (Works of the Academy. Volume No 21), Izd. Voennoy akademii im. M. V. Frunze, 1952, page 24.
12. Voyennaya Mysl', No 5, 1940, page 83.
13. Bol'shevik, No 6, 1943, page 50.
14. Voyennaya Mysl', No 8, 1961, page 43.
15. Trudy akademii..., op.cit., page 26. Istoriya voyn..., op.cit., page 341.
16. Sbornik takticheskikh..., op.cit., page 97.
17. Voyennaya Mysl', No 4, 1950, page 75.
18. Voyennaya Mysl', No 5, 1940, page 82.
19. G. Rouan-Robinson: Voyna v dzhunglyakh (Jungle Warfare), Voenizdat, 1948, page 32.
20. Voyennaya Mysl', No 6, 1966.
21. K. A. Meretskov: Na sluzhbe narodu. Stranitsy vospominaniy (Serving the People. Pages of Reminiscences), Politizdat, 1969, pp 403-404.

22. N. M. Rumyantsev: Razgrom vruga v Zapolyar'ye (1941-1944 gg) (Defeating the Enemy in the Arctic [1941-1944]), Voenizdat, 1963, page 261.
23. Armor, March 1965, pp 32-38.
24. Rumyantsev, op.cit., page 267.

THE INFLUENCE OF HELICOPTERS ON THE TACTICS OF COMBINED-ARMS COMBAT*

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Up until comparatively recently there was occurring a debate on the question of whether or not the rapid development of helicopters as a transport and combat vehicle would appreciably influence or effect change in the principles of warfare. Today nobody entertains doubt any longer. Military operations in Indochina and the Near East attest to definite changes in traditional techniques of warfare caused by the extensive utilization of helicopters.

Two trends are observed in the development of helicopter performance and utilization: one trend is in the direction of utilizing helicopters only as *a means of transport* (chiefly in the tactical zone), while the second trend views them as a *full-fledged weapon*.

As is well known, at first helicopters were employed chiefly to transport troops as well as to supply units (subunits) operating apart from the main forces, and to maintain communications between headquarters of higher control echelons. As more sophisticated types of helicopters became operational, they began to be employed for the purpose of landing tactical airborne forces. This resulted in a substantial increase in depth of simultaneous action by large ground units, which furnished the airborne assault forces, although this new development did not solve the problems of ensuring adequate maneuverability and independence of the helicopter-landed subunits, since they lacked both means of battlefield transport and heavy weapons.

Helicopters as a means of air transport are also employed for rapid displacement of troops in friendly rear areas. In the case of nuclear weapons utilization this will be particularly important in areas of major fires and heavy destruction, as well as in contamination zones. Recently helicopters have come into use for close support of ground units (subunits). Military operations in Vietnam and the Near East indicate that when suitably armed, helicopters can successfully destroy strong points, weapons, personnel and can offer fire support to attacking and defending troops.

Combat helicopters are capable of delivering accurate and dense fire. In South Vietnam the Americans use them, for example, to deliver fire on targets as close as 30 meters from friendly subunits. The UH-1B Iroquois and AH-1G Huey Cobra helicopters employed there, armed with 48 70 mm rockets, can quickly provide a relatively high density of fire. For

* Militärwesen, No 8, 1970.

example, a U.S. airmobile division battalion of UH-1B helicopters (36 units) are capable of firing a total of 1728 in a single attack, which corresponds in effectiveness to an 8-minute attack by an artillery regiment.

The most recent combat helicopters to become operational in the NATO armies include the U.S. AH-56A Cheyenne (top speed 400 km/h, 2-man crew). In addition to excellent flight characteristics, it carries powerful and diversified weapons, as well as armor plate to protect it against small-arms fire.

The extensive use of combat and transport helicopters by the Americans in the aggressive war in Indochina has exerted a comprehensive influence on the methods of troop combat actions. *These actions have assumed the character of airmobile operations*, where troops are transported together with their weapons by helicopter directly to the area (positions) where they will be carrying out their combat missions. The disembarked infantry subunits form into combat formation and conduct either an attack or organize defense. Simultaneously with this, fire support helicopters, moving in from different directions, deliver fires on the targets and separate enemy installations with machineguns, rocket launchers and missiles. *Artillery tactics have also changed* in connection with the fact that guns together with their crews and ammunition are now transported by helicopters directly to firing positions, which sometimes are even situated behind enemy lines. Having completed its mission, a battery returns to its former position or is displaced to a new firing position, from where it continues to give friendly troops fire support. For example, during a 24-hour period a howitzer battery (six 105 mm howitzers) in South Vietnam was shifted by helicopter from one firing position to another more than 30 times, continuously following rapidly-advancing troops. Helicopters are also assigned *reconnaissance missions* (visual and photographic) and *artillery forward observer missions*.

Transport helicopters can supply units (subunits) conducting combat actions and can evacuate wounded and the crews of downed aircraft (including helicopters), regardless of the existence or state of roads. As the Americans themselves put it, the helicopter has become the "workhorse" of the war in Indochina. One third of all helicopters of the U.S. ground forces are operating in Vietnam.

In discussing the versatile, massive utilization of helicopters, one cannot ignore the military technological superiority of the U.S. Army over the enemy and the geographic features of the war theater in question, for utilization of new weapons in small-scale wars frequently leads to an inaccurate, one-sided and sometimes even erroneous picture of their significance for a future war involving the armies of powerful nations. Nor can one mechanically transfer combat methods or techniques from one theater to another. Nevertheless it is essential to observe carefully

trends and changes in combat methods and techniques, extensively utilizing combat experience in all scientific research.

It is extremely probable that in the next few years helicopters of the most diversified types will be adopted by the ground forces of the highly-developed nations. This will affect primarily army aviation battalions and groups. Helicopters may also be used as vehicles for delivering tactical nuclear weapons.

U. S. military experts believe that in a nuclear war *helicopter-delivered airborne tactical assaults* will be employed in addition to paratroop assaults. The principal aim of such operations will be to intensify the pressure applied by the attacking force and to speed up troop advance in order to penetrate through the tactical defense zone more rapidly. They will be utilized most frequently on the main thrust axis of the field army, army corps or division. Such assault forces will be landed at depths of up to 50 km. Of course depth will be determined both by the strength of the assault force and the nature of the enemy's defense.

The objective of such landing operations may be: maximum rapid exploitation of the results of friendly nuclear strikes and destruction of hostile offensive nuclear weapons; capture and holding of important terrain until the arrival of frontally-attacking troops; surprise capture of important objectives (launching sites, control centers, bridges, river-crossing sites, etc) and their destruction; in mountain areas -- seizure of mountain passes and mountaintops.

An airmobile task force (AMTF), in order to avoid being destroyed by the enemy in the landing area, will be compelled to execute maneuvers, for which the troops should be trained and prepared. Airmobile forces designated for operating as AMTF (from motorized infantry and helicopter units) will comprise a special division (army corps or field army) reserve, which should maintain itself in a continuous state of readiness for displacement behind enemy lines. This greatly reduces the command reaction time to situation changes, while a sharp increase in troop mobility in turn improves troop survivability and enlarges capability to conduct combat operations. With the skilled utilization of AMTF it is comparatively easy to impose on the enemy the most unexpected and disadvantageous conditions as well as to hit him harder than in the past.

On the basis of the American concept of conduct of airmobile operations, one can anticipate that their AMTF will be employed most frequently under specific conditions -- on certain axes or in difficult-accessibility terrain which restricts the use of large forces, where they will be compelled to carry out missions without tactical coordination with ground troops units, with only artillery fire and tactical air support. Disembarked

subunits will be provided cover fire by helicopter gunships, as is the case in South Vietnam. Supporting fire should continue until the AMTF has completed its mission or until it is reached by frontally-advancing troops. Subsequently the AMTF subunits can be displaced to a new point behind enemy lines with a new mission.

Success in employment of AMTF depends in large measure on the combat readiness of motorized infantry (airmobile) and helicopter subunits of division (army corps, field army) airmobile reserve, fast delivery and landing. It is very important carefully to coordinate interaction with frontally attacking friendly troops. Although it will not always be possible to work on all details of operation orders, it is essential to practice landing troops on terrain similar to the forthcoming landing area.

Of particular importance in preparing for an airborne assault are matters pertaining to *security of approach routes and landing zones*. Transport helicopters should fly to the landing area at low altitudes in order to eliminate or greatly reduce possibilities of enemy utilization of heavy AA weapons and radars against the AMTF. Heavy fire (nuclear) is delivered on the area of the forthcoming landing. It is considered advisable to fly into the landing area under cover of artillery (airstrike) preparation. This in turn will require that a safe flight altitude be maintained in order to keep helicopters from being hit with friendly artillery fire (tactical air support), as artillery will be delivering fires on the landing area and adjacent targets.

When nuclear weapons are in use, airmobile subunits assigned an AMTF mission concentrate in the troop pickup zone only immediately prior to embarkation, observing protective measures against nuclear destruction weapons. In order to achieve tactical surprise and maximum exploitation of the results of friendly nuclear strikes, the AMTF landing operation should be carried out immediately after these strikes have been made. In such a case the enemy will be unable to undertake anything to neutralize the consequences of the nuclear strike and will be unable to offer organized resistance to the AMTF. As a precautionary measure when approaching the landing area, it will be necessary to protect the eyes of helicopter crew members and AMTF personnel from the flash of the nuclear burst (luminous radiation), and upon landing troops must maintain a safe distance from ground zero, taking into account time of intensive terrain radioactive contamination.

Airmobile troops can be employed in all types of engagement. In the attack they can be employed to establish contact with the enemy under conditions where the latter is conducting delaying actions, during crossing operations on major rivers, as well as in a meeting engagement. In defense these troops will be employed primarily for holding actions, during disengagement (withdrawal) and for engaging airborne assault forces.

The theory of utilization of airborne and airmobile troops is being perfected. It is emphasized in various publications, particularly in the United States, that the problem of ground troops airmobile operations is a central one in all military theoretical research.

U.S. military leaders, utilizing the experience of the war in Vietnam, are elaborating different variants of *employment of airmobile troops in the European Theater*. The growing combat potential of helicopters will make it possible to utilize them extensively for engaging tanks and other small armored targets. The *antitank helicopter* is more maneuverable than a tank, and its combat effectiveness is increased by being armed with AT guided missiles (of the TOW type). Taking advantage of terrain relief and vertical cover, these helicopters can lie in wait for targets in a concealed position and briefly take off, taking the enemy by surprise, aim and fire. Helicopter survivability is enhanced by the fact that it will be carrying out its missions in coordination with artillery, tactical aviation and AA weapons. The number of helicopters in the U.S. Armed Forces is steadily growing. There were 7600 in 1966, and 12,500 by 1969. In 1970 the army took delivery of an additional 1250 helicopters. The importance attached by the Americans to helicopters is also attested by the characteristic fact that every year the Americans train 7500 helicopter pilots and only 4000 pilots for fixed-wing aircraft.

The armed forces of the socialist nations must carefully follow the theoretical elaborations and practical measures taken by our potential enemies in the area of increasing the airmobility of ground troops and be prepared to engage such troops vigorously.

Abridged translation by Col I. Andrushkevich

COMPREHENSIVELY DEVELOP THE THEORY OF MILITARY ECONOMICS

(Responses to the Article "Armed Forces Economics")

Maj Gen A. Muzychenko

The article by Professor A. Lagovskiy* poses very important and vital questions pertaining to expanding research in military economics, the necessity of which is dictated by the present level of armed forces development.

The fact is that scientific and technological progress is substantially altering and complicating military economic problems. Military economic theory can no longer be restricted merely to study of general problems of economic potential and production under wartime conditions. It must shed light on problems of armed forces organizational development under present-day conditions as well. In connection with the fact that in the recent past the peacetime cost of maintaining an army and navy (in the broad sense of the word) was comparatively small, military economic concepts encompassed primarily problems relating to a nation's preparedness to meet the needs of war. Today an economic system is faced with incomparably more complex tasks. In addition to producing everything required for a potential war, it must supply armed forces with all requisite items and maintain a level of armed forces technical equipment and combat readiness guaranteeing reliable accomplishment of national defense tasks.

Achievement of these aims is closely linked not only with the creation of appropriate economic potential but also with efficient utilization of resources allocated for maintaining the armed forces.

Scientific and technological advances open up extensive opportunities for improving the means and methods of producing military hardware and improving the combat characteristics of army and navy. Selection of the most effective means presupposes both an appraisal of the combat performance of new military hardware and a cost-effectiveness examination of all expenditures involved in the development of this equipment. In this connection economic effectiveness of defense expenditures acquires increasing significance. In the opinion of A. Lagovskiy, examination of precisely these problems should constitute an independent scientific discipline -- armed forces economics.

The article "Armed Forces Economics" discusses in detail principal trends in applied research. These include economy of weapons systems and criteria of their economic appraisal, problems of standardization, supply,

* See Voyennaya Mysl', No 1, 1970. Responses to this article were published in Nos 8, 9, 1970, and No 4, 1971.

transportation, repair and maintenance, control and management, etc. One cannot help but note the innovative statement of the problems and the practical orientation of this article, which has drawn the attention not only of professional economists but also of practical workers engaged in problems of planning, weapons and supply.

At the same time we feel that one cannot agree with the author's suggestion which calls for establishment of a "special scientific discipline within the framework of military science, which would encompass theoretical problems of economic activities within the armed forces and would investigate problems of armed forces organizational development" (pp 59-60).

Let us examine the substance of the proposal from a theoretical and practical standpoint.

We have already emphasized the advisability of studying all those matters which in the opinion of Comrade Lagovskiye pertain to the subject of armed forces economics. This is a "diversified complex of objectively existing phenomena, facts, conditions and circumstances within the area of armed forces supply, labor, construction, production, finance and other activities."

In the author's opinion the content of the independent scientific discipline of armed forces economics would be "investigation of all these phenomena, factors, conditions and circumstances for the establishment of the most expedient ways, forms and methods of practical activity within the armed forces" (page 60).

In implementing this proposal we encounter insurmountable obstacles, not to speak of an excessively broad interpretation of the problem. In fact, the above-enumerated items in the area of armed forces supply, production, finance, etc cannot be examined solely from the standpoint of army and navy internal activities.

We shall illustrate this with some examples.

Let us take economic problems connected with the development of weapons systems. They include, as is well known, an economic analysis of expenditures and achieved results at all stages, beginning with development of a prototype model and its industrial manufacture, and ending with its retirement from the arsenal. Consequently economic problems connected with developing new combat equipment and weapons cannot be examined from the standpoint of activities within the armed forces.

Or take the stocks which comprise the foundation of army and navy supply. One can easily see that it is also impossible to examine this question

separately, within a given ministry, for the dimensions of stockpiled resources depend on a nation's peacetime economic potential and conditions of production deployment at the outbreak of war. The greater the extent to which production is complicated at the outbreak of war (particularly a war with the employment of nuclear weapons), the more important it becomes to achieve prior stockpiling of supplies and equipment.

With this interrelationship the establishment of optimal stockpiles of supplies can be studied only in a comprehensive manner, on the basis of taking into account the capability of industry to swing into wartime production and armed forces supply requirements, as well as comparison of outlays for readying industry and for maintaining stockpiles.

The situation is even more complex in regard to transportation. A unified transport system handles both military and civilian needs. The entire process of improving transport facilities and organizing transport service takes place within the economy; the army and navy function as users of transport services.

These examples fairly persuasively demonstrate that without the most precise computation of the nation's economic capabilities it is difficult to pose any important questions pertaining to the adoption of weapons systems, combat equipment and supply. All fundamental military economic tasks pertaining to material outlays and resources cannot be elaborated (let alone resolved) within the armed forces.

An attempt to examine military economic problems from the standpoint of internal army and navy activities would lead to narrowness and one-sidedness of analysis, which would not correspond to the dialectical method. In order to draw correct conclusions from a given phenomenon it is necessary to examine it in coordination and interrelationship with other phenomena. The demand of completeness and comprehensiveness of analysis is a Leninist demand. It cautions theorists and practical workers against errors.

It is quite obvious that such an approach presupposes examination of military economic problems in unity and in connection with a nation's economic capabilities, for army and navy economic problems proper are rooted as it were in the "general" economic system, since it constitutes their material foundation and source of supply. This dictates the objective necessity of examining all matters pertaining to the organizational development and supply of our armed forces in an inseparable link and unity with the economy of the state. Thus it is for all practical purposes impossible to divide military economic problems into two independent areas -- military economics and economics within the armed forces.

Nor can we agree with Lagovskiy's claim that armed forces economics reflects the content of problems being studied just as "economics of industry" and "economics of transportation" define the range of problems elaborated for improving the performance of industry and transport (page 60). One can hardly draw an analogy here: industry and transport are component parts of the economy, which cannot be said of the armed forces.

Industry, transport and armed forces are not single-order terms and therefore are not analogous in substance (this also applies to a description of their economic activities). Industry and transport function on the basis of their internal economic sources; they have their own inherent independent branch economic structure. The armed forces, in contrast to industry and transport, do not possess an internal economic source and function at the expense of the nation's economy. Consequently there is no armed forces economics proper, and one therefore cannot view armed forces economics as economic activity within the army and navy. To all appearances the items which Lagovskiy proposes be assigned to the subject of armed forces economics pertain most closely to theory of military economics and should be viewed within its framework, comprising one of the most important parts of this subject of investigation.

In our opinion theory of military economics is not restricted merely to an investigation of economic potential. It embraces all problems of economic support of the armed forces in peacetime and in time of war, including manpower resources, weapons systems and combat equipment, supply, transport, etc.

In our opinion a division of military economic problems into two independent areas and designation of two independent scientific disciplines will hardly promote the development of military economic research. New disciplines are not the province of willful administrative acts, although it sometimes occurs in practice. They are produced by need and promote the development of science in those cases where it is necessary to investigate new objects or phenomena.

In this sense military economics is not a qualitatively new thing. Substantial changes occur, however, during the course of its development; complex problems arise, correct solution of which is possible only on the basis of profound and comprehensive scientific investigation. In other words the substance of a problem lies not in the creation of a scientific discipline but rather in a deepening and broadening of investigation of concrete military economic problems, with the aim of maximum utilization of the achievements of scientific and technological progress for increasing army and navy fighting efficiency and combat readiness.

We have shown above the organic relationship between military economic problems and the nation's economy. We do not consider it expedient to divide them among two scientific disciplines -- military economics and armed forces economics. We feel that the first stage of military economic training of cadres should comprise thorough study of a military economics course at all command and engineer schools. It is indeed high time for this.

There is no need to prove that under present-day conditions the training of all cadres (including military) possesses three fundamental aspects -- political, technical, and economic. Economics training of specialists has developed substantially in the area of industry. Problems pertaining to the economics of industry, transport, supply and other fields are widely studied at civilian educational institutions.

Thorough knowledge of economics is also essential to command-staff officers, general officers and admirals. Without such knowledge it is impossible today to make a technical-economic analysis of decisions, which is essential not only in the military technical area but also in tactics, operational art and strategy.

Naturally a course in military economics, in addition to general theory of the subject, should also include applied (branch military economics) problems pertinent to the training institution's profile. In addition, such matters as economics of production, the employment, maintenance and repair of combat equipment, military housekeeping economics and methods of various military economic computations should be included in the program of the corresponding disciplines according to the specialization profile of service schools and academies.

Thus there is no doubt as to the necessity of thoroughly studying the items specified by A. Lagovskiy in his article. Meeting full approval and all-out support is his proposal to increase economics training of military cadres. But in our opinion a primary task in implementing the above proposals is not the establishment of a new curricular discipline but rather the introduction of a military economics course at command and engineer schools and organization of departments of military economics. The task of appropriate scientific personnel and departments is elaboration of military economic theory (and applied problems), as well as a thorough study of problems pertaining to military economics within the framework of applied military subjects at all military educational institutions.

THE THIRD GUARDS TANK ARMY IN THE BATTLE OF KURSK

Marshal of the Soviet Union I. Yakubovskiy

The Soviet Armed Forces waged many battles and engagements on the extremely difficult path to final victory in the Great Patriotic War. The defense of the hero fortress of Brest and the hero cities of Moscow, Leningrad, Stalingrad, Odessa, Kiev and Sevastopol was a symbol of insuperable resistance, unparalleled persistence, and an indomitable will to win. The victories in the battles of Moscow, Stalingrad, and Kursk and in the Battle of the Dnepr are written in golden letters in the glorious chronicle of our people and their armed forces.

In 1944 the Soviet Armed Forces conducted 10 large strategic operations during the course of which the entire territory of the Soviet Union, which had been temporarily occupied by Hitler's troops, was liberated. Fascist Germany's allies, Finland and Romania, withdrew from the war, Bulgaria was liberated, and the liberation of Norway, Poland, Czechoslovakia, Hungary, and Yugoslavia was begun.

The last campaign of the war was marked by conducting operations like the Eastern Prussian and Vistula-Oder, the Eastern Pomeranian and Vienna, the Berlin and Prague operations which were remarkable in terms of their art and grandiose in their scope.

In this large and complex system of interrelated operations there were extremely important strategic operations which marked the most important stages on the path to the final victory of the Soviet Union over fascist Germany. Among these stages, I should like to point out three truly great battles -- those at Moscow, Stalingrad, and the Kursk Bulge, which occupy a special place in the history of the last war in terms of their scope and the persistence of the fighting and in terms of their military and political results. These were the battles that decided the fate of our state and of the revolutionary conquests of the Soviet people. In each of them the enemy tried to win the entire war and, as a result, suffered major defeats.

In the Battle of Moscow, Hitler's plan for a "lightning" war was finally buried and the Nazi myth about the invincibility of the German Wehrmacht was exposed. Hitler's wild dream of arranging a parade of his troops in Moscow was frustrated by the heroic Soviet troops. Our victory in the Battle of Moscow was an important turning point in the course of the war. The Soviet Army took the strategic initiative away from the enemy and forced fascist Germany to face the possibility of a prolonged war. The results of our victory in the Battle of Stalingrad were of enormous importance. The history of warfare shows no other example of surrounding

such a large grouping as the 330,000-man German fascist army at Stalingrad. This defeat and the developing strategic offensive of the Soviet troops in the winter of 1942-1943 marked a radical turning point in the Great Patriotic War and in World War II as a whole. The great battle at the Volga laid the basis for the mass expulsion of the German fascist aggressors from our country and accelerated the decline of the fascist bloc. The Soviet Army had taken over the strategic initiative once and for all.

The Kursk Battle, which was prepared for by all the preceding armed conflict on the Soviet-German front and primarily by the victory at Stalingrad, was one of the largest battles of the last war. At the Kursk Bulge Hitler's military machine was dealt a crushing blow, after which the fascist leadership was unable to restore the former striking force of its armies. The overall losses of German fascist troops amounted to more than 500,000 men, up to 1,500 tanks, 3,000 cannons, and more than 3,500 aircraft.¹ The Kursk Battle grew into a large-scale strategic attack of Soviet troops in the summer and autumn of 1943, during the course of which about 90 enemy divisions were routed and all of the Left Bank of the Ukraine and the bases of operation which had been taken near the Dnepr River were liberated from Hitler's occupation troops. The victorious attack of the Soviet troops sharply intensified the crisis within the fascist bloc (Italy's departure from the war and Japan's final refusal to wage war against the USSR) and activated the anti-fascist battle in countries occupied by Hitler's troops. All this foretold a basic turning point in the Second World War in favor of the anti-Hitler coalition which resulted in a situation where fascist Germany was faced with inevitable defeat. I. V. Stalin wrote, "While the Battle of Stalingrad foreshadowed the demise of the German fascist army, the Battle of Kursk brought that army to the point of catastrophe."² This is why reactionary bourgeois historians, writers of memoirs and military writers deliberately distort the events of the Kursk Battle or say nothing at all about its military and political consequences in order to conceal the historic truth from the society of their countries and depreciate the importance of the brilliant victory of the Soviet Army at the Kursk Bulge.

The Kursk Battle is given a worthy place in Soviet literature devoted to the history of the last war. Nevertheless, it requires further intensive research, especially of the combat activities of the armored troops which were used to a greater extent in this battle than ever before in the history of the Second World War. Three of our tank armies, six individual tank corps, up to 15 individual tank brigades and regiments -- about 4,350 tanks and self-propelled artillery mounts in all -- participated in the defensive battle.³ Hitler's troops had 2,700 tanks and assault guns.⁴ During the course of our counterattack, which included the Orel and Belgorod-Kharkov strategic defensive operations, the Soviet troops had at that time and used five tank armies, 14 individual tank and mechanized a considerable number of individual tank brigades and regiments, and a

total of more than 6,000 tanks and self-propelled artillery mounts.⁵ The enemy used up to 1,800 tanks and assault guns in the battle.⁶

Of the two forementioned offensive operations conducted by our troops at the Kursk Bulge, the Orel Operation is of special interest. It has been studied least of all in regard to using tank troops even though three tank armies, the Second, Third Guards, and Fourth, as well as seven individual tank corps participated in it. Yet it is extremely important to devote major attention to a profound analysis of the first experience in combat employment of tank armies with the new organization. As we know tank armies had been conducting combat activities as components of our fronts since the summer of 1942. But at that time they were still not sufficiently supplied with tanks and were composed of many elements: as a rule, there were two tank corps and several infantry divisions. Because of this they were not maneuverable enough and were used mainly as combined-arms armies in the operations. The picture had basically changed by the beginning of the Kursk Battle. As a rule, the tank armies with the new organization were composed of two tank corps, one mechanized corps, and army units. The armies had their own mobile rear services. They became qualitatively new formations which were homogeneous in makeup and they acquired the ability to act independently to operational depth separately from the combined-arms armies.

When speaking of the use of tank armies with the new kind of organization in the Kursk Battle it is necessary to keep in mind two important circumstances which are not sufficiently taken into account by some authors. In the first place, by the beginning of the Kursk Battle the Soviet Army already had experience in using tank troops. This was gained in the battles of 1941-1942. On the basis of this experience certain views were formed also about the employment of tank armies with the new organization as a means of achieving success in strategic and front operations. In the second place, confirmation of these views in combat practice was made more difficult because of the special features of the operational-strategic situation at the Kursk Bulge.

These special features were the following. By the beginning of the battle the Soviet Supreme High Command had created the kind of powerful grouping at the Kursk Bulge which could be the first to go over to the offensive and deal crushing blows to the enemy. But it was decided in the beginning to exhaust the enemy through planned defense. A further specific situation arose during the course of the counterattack of the troops which began with the Orel Operation. This operation developed under conditions where the enemy's attack had petered out, but the enemy still had a sufficiently strong grouping of troops, including tank troops. The defeat of this grouping was the major mission of our troops in the Orel Operation.

The uniqueness of the operational and strategic situation in the Orel Operation was taken into account by the Soviet command which creatively resolved the problem of most effectively utilizing such a powerful striking force as a tank army. This is especially clear from the experience in using the Third Guards Tank Army which dealt strong ramming blows to the prepared defense of the enemy who had concentrated his major forces in the first operational echelon.

But one must note that many problems in employing the tank army with the new organization had to be resolved for the first time and, naturally, the lack of combat experience created certain difficulties. The results of the attack of the Third Guards Tank Army were also affected by the frequent and drastic changes in its mission, the significant regroupings over large distances (this was possible only because of the great maneuverability of the formations), and several other circumstances.

All this apparently served as a reason for the contradictory and frequently negative evaluations in several of our military historical works both of the principles of the combat employment and the results of the combat activities of the Third Guards Tank Army in the Orel Operation.

Because of this, as a direct participant in the forementioned events, I would like to share with the readers my impressions of the role, place, and combat employment of the Third Guards Tank Army in the Orel Operation in July and August of 1943.

1.

The Third Guards Tank Army began to be formed by a Supreme High Command Staff* (Stavka) directive of 14 May 1943 in the region of southern Plavsk in the Kobylansk Forest. It was made up of the 12th and 15th Tank Corps, the 91st Separate Tank Brigade, the 50th Motorcycle Regiment, the 138th Communications Regiment, the 372d Air Communications Regiment, the 39th Reconnaissance Battalion, the 182d Motorized Battalion, and also support units.⁷

The command staff of the army had good training and a great deal of combat experience. It was commanded by the talented tank commander, Lieutenant General P. S. Rybalko. The experienced political officer Major General S. I. Mel'nikov was a member of the military council. Colonel V. A. Mitrofanov, who formerly had held the post of chief of staff of the corps, was appointed chief of staff of the army in May 1943.

The corps were commanded by the experienced commanders major generals M. I. Zin'kovich and F. M. Rudkin. The commanders of the brigades,

*The Supreme High Command Staff (or Stavka) will normally be referred to in this translation as "SHC staff."

regiments, and battalions also had a wealth of combat experience. Many of them like, for example, colonels M. S. Novokhat'ko, A. A. Golovachev, I. I. Sergeyev, L. S. Chigin, and others were at the front from the first days of the Great Patriotic War.

It should be stated that the commanders and many of the troops previously in the army participated in the Kozel'sk Operation in August 1942, in the Ostrogozhsk-Rossoshanskiy and Kharkov operations in the winter of 1943, and in the violent defensive battles in the Kharkov area in February and March of 1943. The Soviet Supreme High Command and I. V. Stalin personally valued highly the great mastery, courage and heroism of the army personnel in the battles for the freedom and independence of our homeland.

Right up to 14 July 1943 the army was in the reserve of the SHC staff and ready for the forthcoming activities in the area of the main attack at the Bryansk front.

During May through July the army carried out various kinds of work in preparation for the battles. Units and combined units were replenished with personnel, arms and combat equipment and the preceding combat experience was analyzed. In preparing the troops and staffs much attention was devoted to studying ways and means of combatting the enemy and exposing the strong and weak points in his actions. The commanders and staffs played out map exercises involving those areas where operations were planned. During the course of these exercises problems of interaction both within the army and with combined-arms large-units were carefully worked out.

In troop training emphasis was placed on working out problems of organizing and completing marches and developing and executing attacks. The attention of the army military council, all commanders and political workers, and the party and Komsomol organizations was directed at insuring that troop training would be carried out under conditions as similar as possible to the combat situation. Tank operation and combat firing occupied a considerable portion of the field training for tank troops. The army was equipped with a special firing range for training in combat firing and working out problems of fighting against the new enemy Tiger and Panther tanks and the Ferdinand assault guns. Motorized infantry troops, artillery troops and troops from special units were carefully trained. The commanders and staffs learned to organize combat and control the troops under complex circumstances.

Party political work was very important in the all-round training of army personnel. It embraced all aspects of the activity of soldiers, sergeants and officers. The army was faced with a battle with a strong enemy. To achieve victory required colossal exertion of moral and physical efforts and everyone was well aware of this. In the party political work basic

attention was devoted to training young replacements, developing cohesiveness in units and subunits, and instilling high moral and combat qualities as well as fierce hatred of the enemy. An exchange of combat experience was organized. This included various forms -- individual conversations, meetings, published reports, and, most important, classes and field training. The propagandists of this experience were mainly officers and NCOs who had been in combat and knew the insidious traits of the enemy. Experienced troops, and there were many of them in the army, already knew from their own experience that it is in the course of training that one creates the necessary prerequisites for achieving victory in a forthcoming battle.

In this regard I should like to take note of the exceptional efforts during the period of preparation. Training of troops and staffs, marches and firing, training exercises and combat alerts were held day and night and all of the army personnel participated in them. Days when only three or four hours were left for sleep and relaxation were not rare. The army commander and the commanders of the corps, brigades, regiments, and corresponding staffs worked hard. There were many visits to the 3d and 63d armies where problems of cooperation were worked out directly with their commanders, lieutenant generals A. V. Gorbатов and V. Ya. Kolpakchi, and with the commanders of the infantry corps and divisions, large artillery units, and combat support units.

Everything was far from the way that it was pictured in the film "Fiery Bulge," the first part of a serialized motion picture called "Liberation." I must take this opportunity to stress my protest against this kind of oversimplification and sometimes clearly incorrect presentation of the situations in which Soviet troops prepared for a decisive conflict with Hitler's troops at the Kursk Bulge. For example, it is difficult to understand the motives guiding the makers of the film when they showed our famous tank officer, commander of the First Tank Army, General and now Marshal of Armored Troops M. Ye. Katukov, enjoying himself fishing on days of the busiest preparation for repulsing the expected enemy attack.

And what can our youth learn from the episode where a lieutenant leaves his combat post without permission and drives a tank to keep a date with a young lady? This episode was fabricated from beginning to end.

During the years of the Great Patriotic War, I served for more than two years in the Third Guards Tank Army and I am well acquainted with its commander, the talented military leader, twice Hero of the Soviet Union, Marshal of Armored Troops P. S. Rybalko. We were all inspired by his talent for leading troops, his unusually broad erudition, and his profound operational thinking. Therefore, we former troops of the Third Guards Tank Army were especially offended to see our commander shown in the movie as a somewhat eccentric, sly, and little man in a woodsman's canvas

raincoat holding a hand siren. After all, he was the head of the tank formation which was a powerful striking and maneuvering force of the front consisting of many thousands of troops and hundreds of tanks and guns. The Third Guards was one of the tank armies which were + e of our Armed Forces.

One can also give other examples of such primitive over-ation of the real combat situation of the last war and the role ar activities in it of our celebrated troop leaders, talented commanders, and all Soviet troops. But I think we have said enough to decisively raise the question of increasing the responsibility of authors of scenarios and film makers in choosing the more typical features of life at the front, the combat activities of the troops, and the creative work of command personnel (commanders and staffs). In turn, the military consultants for films should be more persistent and demand that the scenarios and films give a correct picture of the life and activity of the Soviet Armed Forces during the years of the Great Patriotic War.

But let us turn to more discussion of the Third Guards Tank Army. At the beginning of July 1943 it was almost completely supplied with personnel, arms and combat equipment. Its troops were eager to perform their military duty for the homeland and enter into combat with the hated enemy.

2.

There was ferocious battle at the Kursk Bulge for 7 days, beginning on 5 July. Having concentrated large forces and created powerful attack groupings made up of tank units and combined units, the German fascist command intended to surround and destroy Soviet troops in the region of Kursk with attacks from the north and south.

But the enemy's plans were not realized. The attack of the northern grouping of Hitler's troops was repulsed by our troops on 9 July and the southern grouping was defeated on 12 July. Despite the enormous losses of human life and combat equipment, the enemy attack grouping which attacked Kursk from the north penetrated to a depth of only 10 to 12 kilometers and the grouping coming from the south penetrated to 35 kilometers. The crisis of the German attack had begun. And it was right at that time, on 12 July, that the troops of Bryansk and the left flank of the Western Front shifted to the offensive.

As we know the Orel offensive operation was planned even before developing the defensive battle at Kursk. The Soviet command had decided to begin it at a critical moment in the battle at the Kursk Bulge. By making this kind of decision for the conduct of the offensive operation in the Orel area, it was as if the SHC staff had created one additional guarantee for the overall success of Soviet troops in the Battle of Kursk.

The enemy grouping at Orel consisted of five infantry, eight tank, and two motorized divisions, one tank brigade, and eight separate divisions of assault guns. Numerically it consisted of 900,000 men, 7,480 cannons and mortars, 1,380 tanks and assault guns,⁹ and 1,110 combat aircraft. The main forces of these groupings attacked Kursk from the north, but another considerable portion of it was directed to the left flank of the Western Front and the Bryansk front. The SHC staff decided not to allow even part of these troops to be used for reinforcing the enemy attack grouping which was operating against the Central Front. It set the goal of routing enemy troops to the north, east, and south of Orel with a decisive offensive on the Western and Bryansk fronts and later on the Central Front.

I should like to direct the reader's attention to this particular aspect of the main objective of the operation. I think that without emphasizing this circumstance one cannot correctly evaluate the significance of the Orel operation in the overall system of combat in the Kursk Battle or understand the exceptional uniqueness of the combat employment of the Third Guards Tank Army in it. The Orel enemy grouping relied on a previously prepared deep-echelon positional defense adapted to the advantageous conditions of the terrain and well protected by engineer obstacles. There were mine fields not only in front of the forward area, but also in the rear of the defense. All populated points located within the boundaries of the tactical zone of defense and in rear service defensive installations, at the junctions of roads and in areas of river crossings were prepared for strong, all-round defense. The cities of Orel, Volkhov, Mtsensk, Khotinets, Karachev, and Kromy were transformed into powerful centers of opposition.

The intention of the SHC staff was to use concentrated attacks of the left flank of the Western, Bryansk and Central fronts in the general direction of Orel in order to cut the enemy groupings into separate isolated units and destroy them.

The 11th Guards Army of the Western Front and the 1st and 5th Tank corps which were attached to it were to strike the major blow at Bolkhov and use part of the forces to attack Khotinets.

The 61st Army of the Bryansk Front, reinforced by the 20th Tank Corps, struck a major blow at Bolkhov and was to work together with the 11th Guards Army to surround the enemy grouping in the region of this city, to destroy this grouping, and later attack Orel and use part of the forces to penetrate into the rear of the Mtsensk enemy grouping.

The basic role in the operation was assigned to the Bryansk Front where the major attack grouping (the 3d and 63d armies) were to attack in the general direction of Orel. In addition, the 3d Army had the mission of

using part of its forces in conjunction with the 61st Army to route the Mtsensk enemy grouping and to use the major forces to take Orel from the north. The 63d Army reinforced by the 1st Guards Tank Corps was given the mission of taking Orel from the south and, working together with the 3d Army, to destroy the enemy grouping defending the eastern part of the city.

Having shifted on 12 July to the offensive, the troops of the Bryansk Front met with extremely ferocious opposition from the enemy. Therefore, the tactical zone of its defense was not broken through until the morning of 13 July. But even after the breakthrough the rate of advance of our troops did not increase. The problem was that the German fascist command had begun to bring in fresh divisions¹⁰ to repulse our attacks. With regard to this, Marshal of the Soviet Union G. K. Zhukov notes: "The enemy ~~was~~ bogging down in the Orel theater of operations and began to take the troops from the groupings operating against the Central Front and send them in against the Bryansk Front and against the 11th Guards Army of the Western Front.¹¹ As early as 13 July the enemy command advanced its 5th Tank Division against the 11th Guards Army and the 36th Infantry and 2d Tank Divisions against the major striking forces of the Bryansk Front. So the prediction of the Soviet command that the enemy would reinforce its grouping against the Bryansk Front was completely correct.

Under these circumstances it was extremely necessary to step up the force of the attack by Soviet troops against Orel. To this end, on 12 July added to the Western Front was a new army, the 11th Combined-Arms Army, and to the Bryansk Front, (14 July), the 3d Guards Tank Army which was reinforced by the 2d Mechanized Corps of Lieutenant General I. P. Korchagin and the 24th AAA Division. The tank army was ordered to concentrate in the region of Novosil',¹² by 15 July at the latest.

By the time it entered the battle the Third Guards Tank Army had about 40,000 men, 731 tanks and self-propelled guns,¹³ and more than 700 cannons and mortars.¹⁴ This was a powerful operational formation which had not only great striking force and mobility, but also combat independence which is especially important. The tank army had all the necessary means for conducting combat operations apart from the major forces of the front.

It should be emphasized that during the years of the Great Patriotic War the requirement of insuring the combat independence of tank armies was the major and decisive factor which determined their organizational structure. This arose from the combat mission of operational formations of tank troops and the conditions for their conducting combat activities to operational depth separate from infantry units and frequently on separate and disconnected axes. This requirement applied not only to tank armies, but to a certain degree to tank and mechanized corps and also to tank brigades.

For example, during the period under consideration 2 tank brigades had two tank battalions and a motorized automatic weapons battalion, a tank destroyer battery, and four separate companies: anti-aircraft machinegun, anti-tank gun, technical support, and administrative companies. Having its "own" motorized infantry, the necessary weapons for fighting enemy tanks, and its own rear service subunits, the tank brigade had a certain degree of combat independence.

A tank corps had three tank and one motorized infantry brigades, self-propelled artillery, mortar, tank destroyer, and anti-aircraft artillery regiments, an antitank battalion, five separate battalions (motorcycle, combat engineer, communications, armored transport, and medical), a transportation truck company for hauling fuel and lubricants, a chemical defense company, two mobile repair bases, and a flight of signal aircraft.¹⁵ With this kind of composition, tank corps could perform combat missions independently and successfully in a complex situation.

As for tank armies, as the experience of the war demonstrated their combat independence and capability for operation to operational depth separate from the combined-arms armies was best achieved when they were comprised of two tank and one mechanized corps, a separate tank brigade, and an appropriate complement of army units and combined-units (self-propelled artillery, tank destroyer, mortar, engineer, communications and others). With this kind of organization the tank army could create powerful first and second echelons, have strong reserves, be well controlled and not be unwieldy. Here I am judging from the experience of the combat operations of the Third Guards Tank Army which had such an organization from the day it was formed until the end of the war and during conduct of operations provided brilliant examples of operational maneuver.

Having dealt in so much detail with the organizational structure of tank troops and factors determining it, I would like to once again draw attention to the need for a thorough study of this problem. I think that the creative utilization of the experience of the organizational structuring of Soviet tank troops during the years of the last war can help us considerably even today in resolving important problems in the further development not only of tank, but also of ground troops as a whole.

3.

And so the Third Guards Tank Army had to complete a difficult 150-kilometer march and enter the battle. On the morning of 14 July the sky was overcast, it was raining and it rained continuously for 2 days. In this kind of weather the army completed a march along four routes and by the end of 15 July had concentrated in the assigned region. The 2d Mechanized Corps, completing a march from the region of Kaluga using various types of transport, did not concentrate in the region of Novosil' until the end of 17 July.

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Following instructions from the SHC staff, the commander of the Bryansk Front, General M. M. Popov, assigned the tank army a mission for the middle of the day on 14 July: "After breaking through the 3d and 63d enemy defense armies on the Western bank of the Oleshnya River...enter into battle in the Avvakumovskiy-Zabrody sector and develop an offensive in the direction of Spasskoye and Naryshkino, going around Orel from the north and west. By the end of the first day, cut the Mtsensk-Orel highway and railroad, force the Oka River, and establish a base of operations on the west bank; by the end of the third day of the offensive, take Naryshkino (30 kilometers west of Orel) where you will join up with the 2d Tank Army of the Central Front and surround the Orel enemy grouping."¹⁶

At the same time the front commander ordered the army to be ready for an offensive along the southwestern axis at Stanovoy Kolodez'. According to this variant, the tank army was also to take Naryshkino by the end of the third day, bypassing Orel from the south, and in cooperation with the First and Fifth Tank corps of the 11th Guards Army of the Western Front, surround the Orel enemy grouping.

And so, according to both variants of the offensive of the Third Guards Tank Army the objective of its operations was to surround the Orel enemy grouping.

In the first case the army was to perform this mission in cooperation with troops of the Central Front, and in the second, with troops of the Western Front. The beginning of the offensive was planned for 18 July.

General P. S. Rybalko decided to lead the army into battle with the 12th and 15th Tank corps in the first echelon, the 2d Mechanized Corps in the second echelon, and the 91st Separate Tank Brigade and the 50th Motorcycle Regiment in reserve. On the night of 17 July the corps began their advance into the assembly areas which were located 8 to 10 kilometers from the forward line of the enemy defense. The work of preparing the army troops for combat operations continued throughout 17 July. On this day the battle was organized on the level of the brigade, the battalion, and lower.

But on the morning of 18 July, on instructions from the SHC staff, the front commander pinpointed the mission of the Third Guards Tank Army. Instead of advancing to Spasskoye and Naryshkino, that is, meeting with the troops of the Western Front, the army was to advance to Stanovoy Kolodez' and later to Kromy and, in so doing, assist the troops of the Central Front.

The SHC staff decision was made in light of an evaluation of the circumstances which had arisen by this time on the Orel axis. Throughout

17 July the troops of the main attack force of the Western Front successfully advanced to Khotinets, reaching the rear of the Orel grouping of Hitler's troops. At the same time the advance by the troops of the Central Front to Kromy from the south was not successful. Consequently, there arose a threat of disruption of the plan for surrounding the Orel enemy grouping. In order not to allow this it was necessary, on the one hand, to develop the success of the troops of the Western Front, for which purpose the 4th Tank Army was transferred to it, and, on the other hand, to assist the troops of the Central Front through the forementioned maneuver of the 3d Guards Tank Army.

The new mission of the tank army was: "When the troops of the 3d and 63d armies reach the line described by Odínok, Arsen'yev, Izotkino, Novaya Zhizn', Bortnoye, Aleksandrovskiy and Podmaslovo, to engage in combat in the sector from Bogdanovo to Aleksandrovskiy and attack in the general direction of Stanovoy Kolodez', a region which was to be taken on 19 July -- to rout the enemy reserves and rear echelons in the region of Orel and to cut off the path of retreat of the groupings operating against the Central and Bryansk fronts; subsequently, if the situation is favorable, to take Orel and, working with the 2d Tank Army of the Central Front, rout the enemy grouping which was operating against this front."¹⁷

The attack was delayed until the morning of 19 July so that the army could be more carefully prepared for the combat activities involved in outflanking Orel from the south.

Since the attack according to this variant did not require any basic changes in the structuring of the army or the grouping of the troops, 18 July was spent in working to make the troop missions more precise and organizing cooperation within the army.'

On 19 July at 0800 hours after 10 minutes of artillery and aviation preparation, the troops of the 3d and 63d armies took the offensive. Overcoming stubborn enemy opposition, in two hours of battle on the axis of the main attack they had advanced only to a depth of 1 to 1.5 kilometers.¹⁸ The reason was the poor artillery preparation (only 10 minutes of fire concentration) and the insufficient number of tanks directly supporting the infantry. The latter, including the 1st Guards Tank Corps which was being used for support in the 3d army, were held up at the crossings of the Oleshnya River. In order to increase the force of the attack of the combined-arms armies and force the enemy from the position he occupied, the commander of the Bryansk Front, Colonel General M. M. Popov, ordered the tank army to engage in battle, make a breakthrough in the defense of the enemy, and develop an offensive to the southwest, to Stanovoy Kolodez'. I think it necessary to note that the book Kurskaya Bitva (The Kursk Battle), which was published in 1970, mistakenly asserts that the troops

of the 3d and 63d armies had broken through the rear defensive line of the enemy to a depth of 3 to 4 kilometers before the tank army was committed to battle.¹⁹

At 1020 hours the army advanced in four columns. The brigades of the first echelons of tank corps crossed the Oleshnya River through fords constructed by the combat engineers, deployed in combat formation and attacked units of the 2d and 8th Tank and 36th Infantry divisions of the enemy.

Violent battles ensued and continued without letup until late in the evening. The enemy stubbornly resisted, striving at all cost to hold the line he occupied. The German fascist command sent in almost all the aircraft it had at the Orel base of operations in order to repulse the attack of the tank army. The unremitting firing of tanks and field guns, anti-aircraft artillery, rocket launchers and mortars, the din of aircraft engines, the penetrating wail of dive bombers, the clanging of caterpillar tracks, and the explosions of shells and aircraft bombs merged into a terrible clashing roar. The air was darkened by smoke and dust. The 15th Tank Corps waged especially violent battles on the axis of advance which was defended by the 8th Tank Division which had arrived from the reserve of the "Center" Army Group and launched a vicious counterattack.

Despite the stubborn opposition of the enemy and the continuous attacks of enemy aviation, our large tank units still forced the enemy from the line of the Oleshnya River and by the end of the day had penetrated to a depth of 10 to 12 kilometers. As a result the enemy's rear defensive line was penetrated which led to a turning point in the situation in the direction of advance of the major forces of the Bryansk Front.

Having suffered a defeat at the Oleshnya River, the German fascist troops began a retreat to the line of the Optukha and Optushka rivers during the night of the 20th of July. Smashing the enemy rear guard, the brigades of the 12th Tank Corps advanced 10 to 15 kilometers during the night. In addition, the 97th Tank Brigade under the command of Colonel I. M. Potapov engaged the enemy at Step'. The 30th Tank Brigade under the command of Colonel M. S. Novokhat'ko occupied Zolotarevo, cutting off the Orel-Yelets Railroad. During the night of 20 July, the German fascist command, relying on their Mtsensk grouping, began a retreat to the region of Orel. Having received this information, the command of the Bryansk Front reported it to the SHC staff and at the same time reported that, because of strong opposition from the enemy, the route of the 3d Guards Army toward the west was closed.

But in reality, having reached the Orel-Yelets Railroad the tank army had a real possibility of developing an attack on the southwest axis and depriving the enemy of the possibility of organizing a defense along the Optukha and Optushka rivers. An offensive of the Third Guards Tank Army

on the former axis would have had an extremely significant influence on the further course of the entire operation, especially on the battle at Orel. But this did not happen.

"Proceeding from the idea that the offensive of the tank army at Stanovoy Kolodez' and the troops of the Central Front at Kromy was not developed, the staff of the Supreme High Command decided first to rout the Mtsensk enemy grouping, using not only the Third Combined-Arms Army, but also the Third Guards Tank Army. Therefore, at 0200 hours on 20 July the following directive was sent to the commander of the Bryansk Front:

"1. The most immediate mission of the Bryansk Front is to rout the Mtsensk enemy grouping and move the 3d Army to the Oka River. In order to accomplish this, beginning on the morning of 20 July, Rybalko's 3d Tank Army will attack in the area of Protasovo and Otrada and by the end of 20 July cut the Mtsensk-Orel highway and railroad, developing an attack on Mtsensk from the south during 21 July, and, in conjunction with Gorbатов's 3d Army, destroy the Mtsensk enemy grouping and liberate Mtsensk.

"2. After performing this mission Rybalko's 3d Tank Army is to head south to cut the Mokhovoye-Orel Railroad, assist Kolpakchi's 63d Army in its move also to the Oka River.

"3. Subsequently, Rybalko's 3d Tank Army is to cut the Orel-Kursk Railroad and, upon a decision of the front commander, if the circumstances are favorable, occupy the city of Orel.

"If the situation is not favorable for occupying Orel, Rybalko's 3d Tank Army is to move farther to the west in the direction of Kromy."20

Following this directive, the front commander ordered the 3d Guards Tank Army "...on the morning of 20 July to advance in a northwest direction with the task of reaching the region of Otrada by the end of the day and cutting the Orel-Mtsensk highway and railroad with the intention of attacking Mtsensk, destroying the Mtsensk enemy grouping, and taking the city of Mtsensk on 21 July."21

In order to change over to the offensive in the new direction more quickly, the army commander decided to bring the second echelon, the 2d Mechanized Corps, into the battle. The corps was ordered to set out for Otrada and by the end of the day cut the Mtsensk-Orel road and, with motorized infantry, force the Oka and establish a base of operations. The 15th Tank Corps received the assignment of setting out for the east and also by the end of the day cutting the Mtsensk -- Orel road, forcing the Oka, and establishing a base of operations. The 12th Tank Corps was concentrated in the region of Protasovo preparing to attack Mtsensk.

The tasks were set for the corps at 0500 hours and at 0920 hours they shifted to the offensive. Units of the 2d Tank and 36th and 56th Infantry Divisions of the enemy were withdrawing ahead of the army, offering stubborn opposition with their rear guards. Especially violent battles took place at the approaches to the Mtsensk--Orel road. The German fascist troops tried at all cost to halt the advancement of the army in order to make it possible for their own Mtsensk grouping, whose solid columns were moving along the roads, to withdraw to Orel.

As on the first day of the offensive, the enemy sent in against the tank army almost all of its aircraft operating in this area. During the course of the day they completed more than 1,500 aircraft flights over the combat formations of the army.²²

One must say that throughout the entire operation the fight against enemy aircraft was a very difficult task for the troops of the 3d Guards Tank Army. Taking into account the sharply increased significance of anti-air defense of ground troops under modern conditions, I should like to discuss this historic example in somewhat greater detail.

At the beginning of the operation the army, including the antiaircraft artillery division which was attached to it, had 102 antiaircraft guns and 304 large-caliber antiaircraft machine guns.²³ The air cover for the troops of the tank army was provided by combined units of the 15th Air Army.

Available means of antiaircraft defense insured antiaircraft artillery cover for the main grouping of the army troops, but only as long as the army was not moving. From the beginning of the offensive and also during regrouping, the effectiveness of the antiaircraft artillery coverage was sharply reduced and enemy aircraft were frequently able to launch massive attacks on the combat formations of the tank and mechanized combined units of the army.

The basic reason for this situation was the poor cross-country performance of the wheeled vehicles which were supplied at that time to the antiaircraft machine gun companies of the tank and mechanized brigades and the antiaircraft artillery regiments, both those in the corps and those attached to the antiaircraft artillery division. The fact that they were restricted to roads sharply reduced the possibility of maneuvering anti-aircraft weapons during the course of the offensive and made it impossible to move the means of antiaircraft artillery coverage in the troop combat formations. Moreover, in the Orel operation the situation was complicated by the difficult conditions of the terrain and the extremely poor condition of the dirt roads which, because of the frequent rains, had considerable sections which were completely impassable for wheeled vehicles.

In connection with this, one cannot fail to note that the problem of supporting the ground troops with constant and reliable anti-air defense was critical not only in the Kursk Battle, but in all the other operations of the Great Patriotic War. Searches for effective solutions to this problem, including in the tank troops, did not cease throughout the entire war. Even during the course of the Kursk Battle in a number of tank brigades the antiaircraft machine gun companies were issued vehicles with better road performance and frequently antiaircraft machine guns were installed directly on tanks. Keen-witted soldiers found an extremely original solution: in several units, especially during marches, tank hull machine guns were installed on the turrets of tanks and adapted for firing at enemy aircraft.

Of course, the firing effectiveness of the antiaircraft machine guns was not very great. But creating a solid zone of antiaircraft fire over the tank convoy forced the enemy aircraft to sharply increase their altitude which frequently made aimed bombing impossible or reduced its effectiveness.

Persistent and continuous searches for ways to step up antiaircraft defense for tank troops even at the end of the Great Patriotic War led to the conclusion that it is necessary to install an antiaircraft machine gun on every tank and to create other more powerful antiaircraft artillery weapons which have the same cross-country performance on the field of battle as do the tanks. The experience of the Kursk Battle and other operations in the Great Patriotic War served as an important practical basis for successfully resolving these problems in the postwar years.

Discussing in detail problems of antiaircraft defense for tank troops in the Kursk Battle, I should like to use this example to show once again how important and necessary it is under modern conditions creatively to take advantage of the rich experience of the Great Patriotic War. Even today, despite the basic changes which have taken place in military science, thorough study and creative utilization of the experience of the war will contribute to successful resolution of many problems of further organizational development of our Armed Forces and development of Soviet military theory.

The history of the postwar development of the Soviet Armed Forces includes examples where the lessons of the war were ignored and this inevitably led to groundless fantasizing and voluntarism when resolving important problems of our military organizational development.

Let us return to the events of the second day of the offensive of the tank army. Despite the stubborn resistance of Hitler's troops, the units of the 2d Mechanized and 15th Tank corps persistently moved forward, cut the Mtsensk--Orel road, and by the end of 20 July crossed the Oka in force,

establishing two bases of operation on its western bank: in the region of Zhukov with the forces of the 33d Tank Brigade under Colonel I. P. Silayev and the 43d Mechanized Brigade under General D. M. Barinov and in the region of Novaya Slobodka with the forces of the 53d Motorized Infantry Brigade under Colonel A. A. Golovachev. During the course of the battle the enemy's 56th Infantry Division was routed and 40 tanks and 50 guns were damaged and destroyed and up to 1,000 of Hitler's troops were killed.²⁴

The 3d Guards Tank Army performed the mission set for it on 20 July by the SHC staff and the front commander. Having arrived at the Oka and crossed it in force, the army accelerated the defeat of the Mtsensk enemy grouping and opened up the path for the 3d Combined-Arms Army to envelop Orel from the north.

Following the forementioned directive of the staff of the Supreme High Command, at 0300 hours on 21 July the front commander set a new task for the tank army: to make a sharp turn to the northwest and, advancing on Sukharevka, Zolotarevo, and Stanovoy Kolodez', take the region of Kulikovo, Malaya Kulikovka, Ivanovka, Khotetovo, and Stanovoy Kolodez' and subsequently to plan on operating on the northwest axis to Naryshkino, or on the southwest axis to Kromy.²⁵

Since time was needed for the 3d Army to turn over the bases of operation it had established near the river and to bring the 2d Mechanized and 15th Tank corps out of the battle, the commander of the tank army decided to begin the offensive on the new axis using primarily the second echelon, the 12th Tank Corps, which was located in the region of Protasovo, and the 91st Separate Tank Brigade, which was concentrated in the region of Kazinka.

During the first half of the day on 21 July, the corps and the brigade completed their regrouping to the new area and in the afternoon they took up the offensive against the enemy who was defending the southern bank of the Optushka River. The defense line on the Optushka River, which had been previously prepared in regard to engineer work, was being defended by the 8th Tank, the 262d Infantry, and 78th Assault divisions. Relying on their well-prepared line, Hitler's troops offered stubborn resistance to the army troops. The river itself was a significant natural obstacle. True, its depth did not exceed 0.5 to 2 meters, but the silt-covered bottom made the crossing of tanks difficult. It was necessary first to establish a base of operations with motorized infantry so that later we could prepare river crossings and reinforce the fords with rocks, crushed stone, and logs.

Therefore, we did not succeed in smashing the enemy from the march and crossing the river in force. The mission was not accomplished until the middle of the day on 22 July. After that the 15th Tank Corps and the 2d

Mechanized Corps were brought into the battle. They increased the striking force and by the end of the following day the army, on a 16-kilometer front, approached to Optukha River where the line of defense already prepared by the enemy was located. Fearing an attack by the tank army directly on Orel, which was a key point of the entire defense, Hitler's troops put up furious opposition at this line. Almost all the enemy aircraft were again used on the axis of operations of the tank army. During the course of 23 July alone the fascists made more than 1,500 aircraft flights in attacking the army troops.

The army did not have enough artillery to assure neutralization of the prepared enemy defense line. At the beginning of the battle at the Optushka River there were about 500 guns and mortars which, with a 16-kilometer zone of advance, allowed us to have a density of not more than 30 guns and mortars per kilometer of front while the enemy had up to 25 guns and mortars. Of the 500 guns and mortars, about 120 of which were 45-millimeter.²⁶ The army had only 36 of the 85-millimeter guns and there was not a single gun of 122-millimeter or greater. The light artillery could not reliably neutralize the enemy fire system or centers of resistance and the entire weight of the battle lay on the motorized infantry and the tanks.

When the army's combat operations gradually began to be drawn out, the front commander decided to change the direction of its advance and attack Stanovoy Kolodez' from the southeast.²⁷

During the night of 24 July the 3d Guards Tank Army, having given over the line it held to divisions of the 63d Army, withdrew from battle and regrouped in the region of Petrovo, Annino and Bogodukhov and at 1400 hours on 25 July shifted to the offensive near Stanovoy Kolodez'. The open terrain made it difficult to achieve concealment while executing maneuvers. Therefore, the offensive of the tank army on Stanovoy Kolodez' from the southeast was no surprise to the enemy. Overcoming the stubborn resistance of the enemy, by the end of 26 July the army troops entered the region of Yeropkino and cut the Orel--Kursk railroad.

This ended the combat activities of the 3d Guards Tank Army as part of the Bryansk Front. There it had performed extremely important missions for the staff of the Supreme High Command. Through its active operations on various axes, the army assisted the combined-arms armies in their offensive on Orel, contained eight enemy divisions, and absorbed the attacks of the major enemy aviation forces operating in the Orel area.

The staff of the Supreme High Command evaluated the army activities highly. On 26 July, by an order of the USSR People's Commissar of Defense, all of its corps were changed into guards corps: the 12th and 15th Tank Corps

became the 6th and 7th Guards Tank Corps and the 2d Mechanized Corps became the 7th Guards Mechanized Corps.

During the last part of July the scale of the battle at the Orel base of operations increased even more. On a front extending more than 400 kilometers, both opposing sides fought violent battles with immense exertion of efforts.

At this time the enemy was put in a more difficult position in the zone of attack by the troops on the west flank of the Western Front and the combined units of the 61st Army of the Bryansk Front. By 25 July they were right at Bolkhov and part of the forces had cut the Orel--Bryansk railroad and highway, creating a threat to the main lines of communications of the enemy's Orel grouping.

With the active assistance of the 3d Guards Tank Army, the troops of the attack grouping at the Bryansk Front routed the Mtsensk grouping of Hitler's troops, crossed the Oka and Optukha rivers in force, and by the end of 25 July reached the outer approaches to Orel.

By this time the army on the right flank of the Central Front had penetrated up to 30 kilometers in the direction of Kromy. But, having been weakened a great deal in defense battles, they advanced extremely slowly. In order to reinforce this front, on 26 July the SHC staff decided to transfer the 3d Guards Tank Army to it.

The SHC staff directive instructed: "1. At 2400 hours on 26 July 1943 shift Rybalko's 3d Guards Tank Army from the Bryansk Front to the Central Front.

"2. The commander of the Central Front is to use Rybalko's 3d Guards Tank Army on the right flank in conjunction with Romanenko's 48th Army...

"4. Until 29 July the 3d Guards Tank Army will continue to be supplied by the Bryansk Front..."²⁸ Incidentally, this last point was included because the Central Front did not have material supplies for a tank army.

In implementing this directive, the commander of the Central Front, Army General K. K. Rokossovskiy, ordered the 3d Guards Tank Army to concentrate in the region of Alenovka, Ol'gino, and Borisoglebskoye and be prepared on the morning of 28 July to advance in the general direction of Nikol'skoye and Maloye Ryzhkovo.²⁹

Working together with the 48th Army, commanded by Lieutenant General P. L. Romanenko, the 3d Tank Army was to break through the previously

prepared enemy line of defense at the Malaya Rybnitsa River, cross the Oka in force, and by the end of the day penetrate to a depth of up to 30 kilometers. Bringing the tank army into the battle in the sector of the 48th Army was not only to contribute to the success of the troops of the right flank of the Central Front, but was also to play an important role in the overall battle of our fronts at Orel.

By the morning of 28 July, the 3d Guards Tank Army, having advanced 20 to 25 kilometers to the southwest from the region of Staroye Yeropkino, concentrated in the region of Slobodka, Kalinnik, Ozerny, and Rybnitsa, taking up a new direction of advance. In the 15-kilometer zone of the tank army's anticipated combat operations, the enemy, in his first line, had about two infantry divisions and up to 200 guns and mortars.³⁰ The density of the troops was not great but the promptly reinforced defensive line was tactically advantageous and well equipped. In order to take it, it was necessary to overwhelm the enemy with fire. But, as in the past, the tank army was not well supported with artillery and therefore the artillery of the 48th army was responsible for providing fire support for penetrating the defense at the Malaya Rybnitsa River.

At 1530 hours on 28 July the 3d Guards Tank Army went over to the offensive. The enemy resisted stubbornly. The effect of the artillery and air strikes on the enemy was weak. Because of a shortage of time, the coordination between the combined units of the 48th Army and the tank units was not well organized. As a result the attack on 28 July did not produce the expected success. The night offensive did not produce any significant results either. The tank army, which did not have the support of the infantry of the 48th Army, had to conduct difficult combat actions with varying degrees of success. One must say that the difficulties of the tank army were aggravated also by the fact that the Bryansk Front did not regularly supply the army's combined units with ammunition, fuel and other kinds of material supplies. Experience has shown the inexpediency of transferring a tank army from one front to another during the course of conducting operations. It was as if the army had two masters, one assigning them missions and the other providing the material supplies for their implementation. This kind of duality had extremely negative effects on the army operations during the next two days.

In the middle of the day on 29 July the 3d Guards Tank Army and the 48th Combined Arms Army renewed the offensive. For two days they waged heated battle to break through the strongly fortified defensive positions of the enemy who initiated violent counterattacks with the support of a large amount of artillery and aviation. The situation required temporary curtailment of the offensive and more careful preparation for the breakthrough of the enemy defense.

During the evening of 30 July the front commander ordered the troops of the 48th Army and the 3d Guards Tank Army temporarily to halt the offensive, strongly reinforce the lines reached, and use the next day for more careful organization of the battle and the augmentation of troop reserves.³¹

Disturbed by the slow rate of advance of the troops of the Central Front, at 0215 hours on 1 August 1943 the SHC staff gave the commander of the Central Front a directive containing the following: "Recently, in connection with the offensive of the troops of the Bryansk Front and of the left flank of the Western Front, the enemy has considerably weakened his grouping operating on the Central Front. Five tank divisions, two motorized divisions, and up to two or three infantry divisions have been removed from this sector.

"At the same time the Central Front has been considerably reinforced with tanks since Rybalko's 3d Guards Tank Army has been attached to it. All this has led to an improvement in the situation of the troops at the front and has created favorable condition for decisive offensive actions. But up to this point the front command has not taken advantage of these circumstances sufficiently.

"The staff of the Supreme High Command orders:

"1. Immediately prepare and decisively attack, using the forces of the 70th Army and the 2d Tank Army, in the general area of Chuvardino, Krasnaya Roshcha, and Apal'kovo. At the same time, the 13th Army is to break through the enemy defense west of Krasnikova and prepare conditions for the 3d Guards Tank Army to enter the breached defense the moment that army has concentrated.

"2. By 4 or 5 August complete the concentration of the 3d Guards Tank Army in the region south of Krasnikovo with the mission of developing the success of the 13th Army and, with an attack in the general direction of Kromy, overpower the enemy defense along the western bank of the Oka River thereby assisting in the advance of the 48th Army.

"3. In the future it should be kept in mind that both tank armies are to be used to envelop Orel from the west, assisting the Bryansk Front in routing the Orel enemy grouping and taking the city of Orel."³²

Following the order of the front commander, the 3d Guards Tank Army withdrew from action and by the morning of 4 August had concentrated in the region of Bel'dyazhi, Krasnikovo and Rechitsa, which is 30 kilometers northwest of Voronets.

On the morning of 4 August the front commander issued combat instructions in which it was stated: "...at 1300 hours on 4 August 1943, the 3d Guards

Tank Army with attached reinforcement units is to shift to the offensive from the line of Bel'dyazhi and Cherepanovo with the mission of crossing the Kroma River in the Kolki and Krasnaya Roshcha sector and take the region of Apal'kovo, Gnezdilovo, and Leshnya; subsequently, developing an attack in the general direction of Khmelevaya, Gnilye Boloto and Khot'kovo, cut off the enemy's path of retreat to the west and southwest from the area of Kromy, Orel, and Naryshkino..."³³ Thus, the 3d Guards Tank Army was to break through the strong defense of the enemy at the Kroma River and then overcome a number of other intermediary positions to a depth of up to 20 to 25 kilometers.

The overall situation in the region of the Orel Bulge during that time was characterized by the fact that during the night of 4 August the troops of the Bryansk Front broke through to Orel and by dawn on 5 August had completely liberated it.

By 4 August the troops of the Central Front were at the approaches to Kromy. The 13th and 2d Tank armies waged heated battle at the line of the Kroma River. The 3d Guards Tank Army was also supposed to add to the force of the attack by these armies.

After the liberation of Orel the center of the battle shifted to the region of the cities of Khotinets and Kromy which were powerful centers of defense covering the flanks of the enemy grouping and important lines of communication along which they retreated from the region of Orel to Bryansk. By shortening the line of the front, Hitler's command was trying to reinforce its troops operating in the regions of Khotinets and Kromy so as to ensure unimpeded movement on the railroads and highways going from Orel to the west. Therefore the fighting on the Khotinets and Kromy axes was very persistent. Slowly retreating, the enemy made extensive use of mobile defenses at the lines, the majority of which had been previously prepared.

The difficulties were intensified also by the fact that by that time the 3d Guards Tank Army had a great shortage of tanks and personnel. Right before the beginning of the offensive, it was resupplied with 200 tanks and had 417 tanks and self-propelled artillery mounts.³⁴ Despite promises from the front, the army did not receive artillery reinforcements, even though the enemy artillery grouping was strong. Thus, in the 12-kilometer sector of the forthcoming offensive we had 46 guns and mortars for 1 kilometer of front and the enemy had 31. Moreover, the tank army had no heavy artillery at all. Because of this, the fire support for the tank army's offensive was assigned to the artillery of the 13th Army where three artillery support groups had been created. But they rendered effective assistance to the tank army only on the line of the Kroma River and further support was halted because of the lack of coincidence of the

offensive line. Advancing in a northwesterly direction, the tank army left the offensive sector of the 13th Army.

The 3d Guards Tank Army went over to the offensive at 1400 hours on 4 August with three corps in the first echelon. The enemy tried to hold back our troops with artillery fire and counterattacks of infantry and tanks. Enemy aircraft continuously bombed the combat formation. The army met with especially strong opposing fire when approaching the Kroma River. Its opposite bank was not occupied by our infantry units. Therefore, the tank army could not cross the river in force from the march. It was necessary to prepare for the crossing under fire from enemy artillery and aviation.

During the night of 5 August the crossing, which had been halted by enemy aircraft, was renewed and in the morning the tank and mechanized corps of the army crossed the Kroma in force. By the end of this day they had crushed enemy opposition and began to pursue the enemy.

Taking intermediate defensive lines, by the end of 8 August the 3d Guards Tank Army had penetrated up to 20 kilometers and had approached the line of Troitskiy, Khmelevaya, and Katyshi. On 9 August its combined units were in control of this defensive position. But the enemy succeeded in retreating to the next, strongly reinforced position on the line of Gniloye Boloto, Ivanovka, Soskovo, and Yen'shino. The heights adjoining it from the east and northeast were turned into a strong center of resistance with a well developed system of engineer fortifications.

The tank army again had to break through a previously prepared line of defense while its striking force was considerably reduced because of losses. Therefore, to perform this combat mission, a shock tank group was created to include the 91st Separate Tank Brigade, the tank subunits of the 6th Guards Tank Corps, the 33d Tank Brigade of the 7th Guards Mechanized Corps, and the tank company of the 50th Motorcycle Regiment -- 110 tanks in all. The group was reinforced with one tank destroyer brigade and two regiments of guards mortars.

The offensive was begun on 10 August after a 10-minute artillery barrage. Directly behind the tank group came the 43d Guards Mechanized and the 13th and 52d Motorized Infantry brigades. The remaining troops of the army operated on the flanks.

The day of 10 August was extremely difficult for all the tank troops. I frequently recall the exceptionally ferocious battle of the 91st Tank Brigade over a nameless height to the east of Soskovo. Hitler's troops had turned the height into a strong point saturated with artillery, mortars, self-propelled mounts, and Tiger tanks. The bloody battles at Soskovo ended late in the evening. The height was taken with a flank attack.

An important center of enemy resistance was destroyed. Up to 20 enemy tanks and assault guns burned on the battlefield. The remains of the enemy units began a disorderly retreat in a westerly direction. Troops of the 13th Army pursued them.

During the course of this battle the 3d Guards Tank Army inflicted on the enemy considerable damage, but also sustained large losses itself. On 11 August it was put into the reserve of the staff of the Supreme High Command and concentrated in the region of Sukhaya, Torkhovo, Apal'kovo and Kholodovo. The offensive activities of the 3d Guards Tank Army in the Orel operation ended here. Soon a telegram was received from the commander-in-chief of armored and mechanized troops, General Ya. I. Fedorenko, in which it was stated that Supreme Commander I. V. Stalin valued highly the combat activities of the 3d Guards Tank Army and expressed his gratitude to all of the army personnel.

4.

During the course of the Orel offensive operation the Soviet troops destroyed a large enemy grouping. Elimination of the Orel base of operations sharply changed the entire situation in the center of the Soviet-German front and was of enormous military and political significance. As we know, German propaganda called the Orel base of operations a dagger pointed at the heart of Russia. But, as a result of the powerful attacks by the troops of the Western, Bryansk and Central fronts, this base of operations was eliminated and the German fascist troops stationed there were routed. Favorable opportunities opened up for our armies to further develop the offensive toward the Dnepr and the borders of Belorussia. The attacks of our troops in the Orel area not only prevented the fascist command from shifting part of its forces from the Orel base of operations, but from 12 through 30 July, forced it to send 11 divisions there, including three tank and two motorized divisions.³⁵

During the entire course of the operation the fighting in the Orel area was persistent and violent. K. K. Rokossovskiy writes in his memoirs, "We literally had to gnaw through one position after another."³⁶ Each kilometer of advance required great exertion of efforts, persistence, and military skill by the offensive troops. The powerful attacks of the Soviet troops broke down the enemy defense and created a critical situation for the enemy, first on one sector of the front, then on another.

The major combined tank units and formations, including the 3d Guards Tank Army, played an important role in routing the enemy. The troops actively assisted the formations of the Bryansk and Central fronts in routing the enemy groupings at Mtsensk, Kromy and Orel.

From 19 July through 10 August the army had to break through previously prepared enemy defense lines seven times, including twice with forced crossings of water barriers. During the course of the operation, the staff of the Supreme High Command changed the direction of the tank army offensive six times in its interests, ensuring the advance of combined-arms armies. Each time the 3d Guards Tank Army moved in a new area direction the enemy was placed in a difficult situation; he was forced to send reserves into combat and weaken his groupings along other axes. The tank army demonstrated good maneuvering and striking capabilities for increasing the depth of the offensive operation of a front, especially in the offensive campaigns of 1944-1945.

A number of published works by our Soviet historians and other military specialists have drawn conclusions that the operational employment of the 3d Guards Tank Army in the Orel operation was somehow incorrect. One cannot agree with these conclusions completely.

It is true that the 3d Guards Tank Army was not committed in the breakthrough as was usually done in operations of the third period of the war. Before July of 1943 there was no experience at all in combat employment of a tank army with the new organization on the offensive. And in this sense the utilization of the 3d Guards Tank Army on the Bryansk Front, the 2d Tank Army on the Central Front, and the 4th Tank Army on the Western Front was, so to speak, a touchstone. The first experience in combat operations of the forementioned armies at Orel was taken into account in the Belgorod-Kharkov operation of the Voronezh and Step' fronts where the 1st and 5th Guards Tank armies were committed to battle to complete the penetration of the major line of defense and develop the success to operational depth.

In subsequent operations of the Great Patriotic War, as a rule, after the combined-arms armies had taken the main line of defense tank armies were committed in the breakthrough, broke through the second line, and then exploited the success to operational depth. Only the 2d and 5th Guards Tank armies in the Belorussian operation, the 1st Guards Tank Army in the L'vov-Sandomir operation, the 6th Tank Army in the Yassko-Kishinev operation, and the 5th Guards Tank Army in the Eastern Prussian operation were sent through the breach after the combined-arms armies had taken the main and second defense lines of the enemy.

During the war years there were frequent cases where the tank armies broke through the main line of defense with advanced detachments. For example, the 3d Guards Tank Army in the Kiev operation, the 1st and 3d Guards Tank armies in the Zhitomir-Berdichev operation, the 4th and 3d Guards Tank armies in the Proskurovsko-Chernovtsy operation, and the 2d and 5th Guard Tank armies in the Umansk-Batoshan operation.

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During the third period of the war the staff of the Supreme High Command tried not to use tank armies to break through the enemy's main line of defense. And if tank armies were used for this purpose, it was only in those cases where the combined-arms armies did not perform the given mission quickly. This was the situation with regard to using tank armies in combat in the last war.

Now let us turn to conclusions about the employment of the Third Guards Tank Army in the Orel operation. For a correct understanding of this question, it is necessary to explain clearly the role and position of the Orel operation in the overall system of offensive operations by our troops at the Kursk Bulge. As has already been pointed out, the entire point in carrying out this operation was an attempt to exert a decisive influence on the course of the entire Kursk Battle. Of course, it was also planned to send the 3d Guards Tank Army into the breach but the situation turned out to be such that, as was noted above, at Orel the enemy had a large grouping and a well-developed previously prepared system of defense. Under these circumstances, the combined-arms armies did not have enough forces to break through the defense and create conditions for allowing the tank army to enter the battle. If the 3d Guards Tank Army had not been called in to break through the prepared defense lines, the troops of the Bryansk and Central Fronts obviously would not have been successful.

Only after this is clarified can we understand the reasons for changing the areas of the offensive of the 3d Guards Tank Army in the Orel operation which was conducted with the objective of increasing the shock power of the combined-arms armies and containing the enemy reserves. During the course of the operation the 3d Guards Tank Army along with the combined-arms armies and sometimes alone consistently broke through the defense of the enemy and contributed to destroying the enemy through its own powerful attacks. In this respect, one cannot fail to agree with General S. M. Shtemenko who came to the conclusion that the activities of the 3d Guards Tank Army "exerted a decisive influence on the development of the offensive of the troops at the Bryansk Front and played no small role in the successful outcome of the entire operation for routing the enemy grouping at Orel."³⁷ The entry of the 3d Guards Tank Army into the battle at the line of the offensive of the 48th and later at the line of the 13th Army also contributed to certain successes of the troops of the Central Front.

On the whole, the activities of the 3d Guards Tank Army forced the German fascist command to send a number of divisions against it from other sections of the Soviet-German Front as a result of which the army contributed to the successful offensive of the troops of the Voronezh and Step' fronts in the Belgorod-Kharkov area.

This was precisely the point of such "unusual" employment of the 3d Guards Tank Army by the SHC staff in the Orel operation. I suggest that this is a good example of a creative resolution to major, operational and strategic problems. The fact that it was a tank army which was used to perform such tasks is also no accident. Having great mobility and combat independence, it could change the directions of its operations sharply and quickly.

Of course, there were also shortcomings in the utilization of the 3d Guards Tank Army. First of all, one cannot acknowledge that all of its turns and regroupings were completely justified. As was already noted, the turning of the entire 3d Guards Tank Army on 20 July for the offensive against the Mtsensk enemy grouping was not justified either by the overall situation or by the makeup of that enemy grouping the tank army was supposed to destroy. In my opinion, in order to cut off the routes of retreat of the Mtsensk grouping at Orel, it was sufficient to use the 2d echelon (2d Mechanized Corps) and the reserve (the 91st Separate Tank Brigade) of the army and, using the major forces (12th and 15th Tank Corps), continue the offensive toward Stanovoy Kolodez' so that the enemy would not have a chance to consolidate strongly at the Optukha River. This solution would have spared the army of the unnecessary regrouping of all its corps. In this particular case there was required from the SHC staff a more flexible mission assignment for the 3d Guards Tank Army.

It should also be noted that when breaking through the prepared enemy defense line the army did not have the necessary reinforcements, primarily heavy artillery. Also, aviation support was not always adequate.

Finally, it must be stated that the frequent and sharp changes in the direction of the offensive of the tank army frequently placed it in difficult situations. Its large units did not have sufficient time for preparing for the attack which, naturally, led to oversights in organization of control, reconnaissance and other kinds of combat support. A number of measures for preparing the troops and providing for their material and technical support miscarried. There was not sufficient time to organize coordination within the army, especially with the large infantry units and the artillery of the combined-arms armies. Experience has shown that the offensive of any tank army is more effective in cases where this army has performed its assigned missions in close cooperation with the separate tank (mechanized) combined units lacking in other areas of the front. Sometimes the 3d Guards Tank Army did not have this kind of coordination.

In conclusion, it must be stated that the experience of employing tank armies and tank and mechanized corps in the operations of the last war is of great interest even under modern conditions. Despite the radical changes which have taken place in the military field such experience

provides rich material for serious theoretical generalizations in the elaboration of problems in the combat employment of large masses of tank troops for performing operational and strategic missions in modern warfare.

FOOTNOTES

1. 50 let Vooruzhennykh Sil SSSR (50 Years of the USSR Armed Forces), Voenizdat, 1968, p 369.
2. J. Stalin, O Velikoy Otechestvennoy voyne Sovetskogo Soyuza (The Great Patriotic War of the Soviet Union), Gospolitizdat, 1947, p 114.
3. There were 3,300 tanks and self-propelled guns at the Central and Voronezh fronts. (See Velikaya Otechestvennaya Voyna Sovetskogo Soyuza 1941-1945. Kratkaya istoriya. [The Great Patriotic War of the Soviet Union 1941-1945. A Brief History] Voenizdat, 1970, p 239) and 1,030 tanks and self-propelled guns at the Step' and Southwestern fronts (5th Guards Tank Army, 10th Tank, and 2d Tank). Thirty percent of our tanks and self-propelled guns were light.
4. Velikaya Otechestvennaya voyna Sovetskogo Soyuza 1941-1945. Kratkaya Istoriya, p 238. The enemy had mainly medium and heavy tanks.
5. At the beginning of the counteroffensive there were 4,800 tanks and selfpropelled guns (see Velikaya Otechestvennaya voyna Sovetskogo Soyuza 1941-1945. Kratkaya Istoriya, p 250). During the course of the attack the 3d Guards Tank Army arrived (731 tanks and self-propelled guns) as did the 4th Tank Army (652 tanks and self-propelled guns).
6. Velikaya Otechestvennaya voyna Sovetskogo Soyuza 1941-1945. Kratkaya Istoriya, p 250.
7. Archive MD USSR, fund 316, inventory 4440, file 18, sheet 1.
8. The army commander P. S. Rybalko, member of the Military Council S. I. Mel'nikov. The 12th and 15th Tank Corps operated as part of the former 3d Combined Tank Army which was formed back in May of 1942.
9. Among these, in the German 21st Separate Tank Brigade there were more than 100 Tiger and Panther tanks.
10. During the period from 12 through 17 July the enemy sent in the 5th, 8th, and 12th Tank divisions and the 36th Infantry Division from the reserve of the "Center" Army Group and the 26th and 183d Infantry divisions from the 2d Army and the 4th Tank Army.

11. G. K. Zhukov, Vospominaniya i Razmyshleniya, (Recollections and Reflections), APN Publishing House, 1970, p 463.
12. Archive MD USSR, fund 315, inventory 4440, file 62, sheets 1-2.
13. Including: T-34 medium tanks -- 475, T-70 light tanks -- 224, and self-propelled artillery mounts -- 32.
14. Archive MD USSR, fund 315, inventory 4440, file 62, sheets 1-28; file 33, sheets 2-23.
15. Archive MD USSR, fund 315, inventory 4440, file 3, sheets 61-69.
16. Archive MD USSR, fund 668, inventory 73237, file 2, sheet 1.
17. Archive MD USSR, fund 202, inventory 1190, file 9, sheets 18-19.
18. Archive MD USSR, fund 315, inventory 4440, file 18, sheet 5.
19. G. A. Koltunov, V. G. Solov'yev, Kurskaya bitva (The Kurst Battle), Voenizdat, 1970, p 233.
20. Archive MD USSR, fund 132, inventory 2642, file 34, sheets 177-178.
21. Archive MD USSR, fund 315, inventory 4440, file 1, sheet 4.
22. Archive MD USSR, fund 226, inventory 3210, file 99, sheet 3.
23. Archive MD USSR, fund 315, inventory 4440, file 62, sheet 3.
24. Archive MD USSR, fund 315, inventory 4440, file 18, sheet 8.
25. Archive MD USSR, fund 315, inventory 4440, file 18, sheet 8.
26. Archive MD USSR, fund 293, inventory 80093, file 9, sheet 3.
27. Archive MD USSR, fund 668, inventory 73237, file 2, sheet 13.
28. Archive MD USSR, fund 226, inventory 329, file 33, sheet 228.
29. Archive MD USSR, fund 132-A, inventory 2642, file 26, sheet 6.
30. Boevoy opyt bronetankovykh i mekhanizirovannykh voysk v Otechestvennoy voyne (Combat Experience of Armored and Mechanized Troops in the Patriotic War), Collection 3, Voenizdat, 1944, p 25.
31. Archive MD USSR, fund 226, inventory 329, file 33, sheet 355.

32. Archive MD USSR, fund 132-A, inventory 2642, file 34, sheets 180-181.
33. Archive MD USSR, fund 226, inventory 329, file 33, sheet 393.
34. Boyevoy opyt bronetankovykh i mekhanizirovannykh voysk v Otechestvennoy voyne, Collection 3, p 91.
35. 5th, 8th and 12th Tank divisions, "Velikaya Germaniya" motorized division, 20th Motorized Division, 26th, 36th, 95th, 129th, 183d, 253d Infantry divisions.
36. K. K. Rokossovskiy, Soldatskiy dolg (The Soldier's Duty), Voenizdat, 1969, pp 227-228.
37. S. M. Shtemenko, General'nyy shtab v gody voyny (The General Staff During the War Years), Voenizdat, 1968, p 175.

THE DEVELOPMENT OF MILITARY SPACE SYSTEMS AND EQUIPMENT IN THE USA

(From Materials of the Foreign Press)

A. Vasil'yev

In recent years Pentagon circles have been giving more recognition to space systems as an effective means of supporting combat operations on the ground, at sea, in the air, and in space.

In spite of financial difficulties brought about by the increased aggression in Southeast Asia, the draft of the budget for 1971 envisions appropriating for use in space work in the interests of the Department of Defense about 1.5 billion dollars which comprises approximately 30 percent of all of the allocations on space research in the U.S. as a whole. If one takes into account that a considerable portion of the work done by other agencies and departments is used for military purposes, this percentage becomes considerably greater.

Space reconnaissance systems. The idea of conducting reconnaissance from space arose in the U.S. long before the launching of the first artificial earth satellite. The idea has now been carried out in practice in satellites for photographic and radiotechnical reconnaissance and satellites intended for detecting nuclear explosions. Satellites which make it possible to fix the launching of missiles and also multipurpose satellites are being created at increased rates.

The most effective artificial earth satellites used in the U.S. for military purposes include satellites for photographic and radiotechnical reconnaissance. The creation of such systems provides the Pentagon with valuable information, according to the foreign press.

The space system for photographic reconnaissance has artificial earth satellites for survey and detail reconnaissance. The former are launched in higher orbits and serve for obtaining photographs of large areas without very much detail of objects; the latter are launched into lower orbits and provide photographs of smaller areas but with great detail. Information from the artificial earth satellites reach earth in the form of exposed photographic film in containers, dropped from the satellite at a given moment in time and in a predetermined region.

The satellites are placed in near polar orbits with an angle of inclination of 110-115° which creates the most advantageous conditions for reconnoitering the territories of the Warsaw Pact countries and China. The launching of a reconnaissance satellite on 22 July 1970 with a somewhat unusual orbital angle of inclination of 60 degrees was an exception. Foreign

observers explained this fact by their desire to conduct reconnaissance of the course of military activities in the Near East. With this inclination of orbit, the satellite passes over the regions of the Near East twice during the course of a day (before dawn and before the sun goes down). The purpose of this satellite is revealed also by the fact that it was launched two weeks before the cease fire agreement went into effect.¹

In order to conduct detailed reconnaissance, in 1969 the Americans began to use maneuverable satellites weighing 2.5 tons launched by the Titan 3B booster rocket into orbits with initial perigee altitudes of 120 kilometers. By maneuvering the satellite can take a more favorable position in orbit for photographing.²

In the future it is expected that television cameras instead of photographic cameras will be used for artificial earth satellites and this, according to statements of the American press, will sharply reduce the number of launches since, using one artificial earth satellite, it will be possible to conduct reconnaissance for a year and even longer it will be possible to obtain reconnaissance information on a realtime scale.

In order to obtain a television picture of the region under reconnaissance at points on earth in a realtime scale, the Americans intend to use repeater satellites located in stationary orbits. It is planned for information to be transmitted from the reconnaissance satellites to the repeater satellite along radio links of the millimetric band or with the use of laser equipment and the information will be subsequently transmitted to the earth along radio links of the centimetric band. It is planned to test laser equipment under space conditions on the ATS-F and ATS-G military experimental satellites which are to be launched in the first half of the 1970s.

According to information from the foreign press, the Americans launched the first experimental repeater satellite in 1968 with the "Atlas Agena-D" booster rocket into an orbit with an inclination of 9.9 degrees. The island of Guam is considered to be the most convenient place for receiving television pictures from the reconnaissance satellites via the satellite relay.

The space system for radiotechnical reconnaissance is intended for determining the basic parameters and locations of radiotechnical navigation equipment, anti-satellite defense and anti-missile defense by intercepting and analyzing their radiations. Satellites included in the system are launched into nearly circular polar orbits to an altitude of 300-500 kilometers with "Atlas Agena-D" booster rockets. Satellites for detailed photo reconnaissance are launched at the same time or separately (two satellites simultaneously).

The development of satellites for radiotechnical reconnaissance led to the development of the LASP artificial earth satellite. In August of 1970 it was launched into circular orbit with the Titan-3C booster rocket. The opinion has been expressed that when such satellites go into operation there will no longer be a need for aircraft and ship means of radiotechnical reconnaissance. The characteristic features of the satellite which was launched are its great weight (about 10 tons), its size (15 meters in length), and its low orbit (about 185 kilometers). The satellite was to have orientation along three axes and accurate stabilization. The station for receiving information was constructed in the state of Colorado and was to go into operation by July of 1970.³

In order to track ships in the open ocean, along with improving photo and television equipment and equipment for radiotechnical reconnaissance, the U.S. has stepped up work in program 749 which is aimed at creating radar stations with side scanning for reconnaissance satellites.

American artificial earth satellites for detecting nuclear explosions have been launched in circular orbits. There have been launched six pairs of such satellites in all: the last two now make up the operational "Vela-Hotel" space system for detecting nuclear explosions. The press points out that the pair of satellites launched on 8 April 1970 has equipment for detecting nuclear explosions not only in space and the upper regions of the atmosphere, but also on earth.⁴

During the process of developing space reconnaissance systems, the U.S. created multipurpose reconnaissance satellites which simultaneously conduct television reconnaissance and record missile launchings and nuclear explosions. It has been predicted that these satellites will also carry out photographic reconnaissance.

Multipurpose satellites were launched in 1970. The first two were experimental and were launched on 19 June and 21 August; the third was launched on 6 November in order to put an operational satellite into orbit and is designed to detect missile launchings from the territory of the USSR and the PRC.⁵ It was planned to put it into orbit in such a way that it would be located over Southeast Asia. The powerful Titan-3C booster rocket was used for the launching. Information from the satellite was to be received on a realtime scale by a receiving station in Australia (500 kilometers southwest of Adelaide) and then transmitted to the air defense command post (NORAD) via the communications satellite TacSatCom-1 or IDCSP.

After launching, the satellite did not go into the calculated orbit and during the process of revolution it constantly moved toward the east, as a result of which it was located over the given region only 40 percent

of the time.⁶ The Americans planned to launch the next multipurpose satellite for observing missile launchings from submarines in the first half of 1971.

The navigational satellite system in the U.S., presently a Navy system, has been in operation since 1968. It uses three satellites in circular orbits at an altitude of about 11,000 kilometers. The system insures the navigation of surface ships and submarines with an accuracy of about 200 meters.

During the time of operation of this system the Americans have intensified their study of possibilities for expanding the area of its application. In particular, they have investigated the question of using it for determining the coordinates of places of concentration of troops and enemy combat equipment.⁷ To achieve this, it is planned to send to the area of troop concentration an observer with reliable equipment for receiving signals from the "Transit" satellite and relaying them to the command post.

In addition to searching for new areas of application for the existing navigation satellite systems, the U.S. Department of Defense is working on creating systems which are similar but which can be used by all branches of the armed forces. It is thought that the "Timation" system developed by the Navy or that being created by the Air Force according to the 621B program can serve these purposes.⁸

It has been calculated that the first of these should have three groups of artificial earth satellites (with seven satellites in each), placed in circular polar orbits at an altitude of 15,000-18,000 kilometers. The satellites of each group are to be distributed in one orbit with the planes of the orbit separated 60 degrees from each other. The second system is also to have three groups of satellites (with five satellites in each), but one satellite of each group will be located in a stationary equatorial orbit and the remaining four, in stationary orbits somewhat inclined toward the plane of the equator. Each group of satellites will work with three ground stations (one primary and two auxiliary), and it will be possible to locate all stations in the U.S. or on islands belonging to it.

A characteristic feature of this system is that it can be used for the navigation of any objects on land, at sea and in the air, particularly for the navigation of aircraft carriers and tactical aviation, tanks, motor vehicles and infantry subunits. Moreover, it is to have good electronic anticountermeasures.

It is thought that the system will insure navigation with an accuracy of within several dozen meters and this will make it possible to make

corrections during flight on a realtime scale in the inertial guidance systems of the "Poseidon" and "Minuteman" type missiles.

Americans think it possible to create the experimental system according to the 621B program in 5 years and the operational system is intended to go into operation in the 1980s.

In addition to specialized satellite navigational systems, the U.S. is working on multifunctional systems for performing several tasks simultaneously. It is known that in 1970 the U.S. Navy began the work of studying the possibilities of creating the UCNI system⁹ which makes it possible simultaneously to control aircraft located in the air at any point on the globe, establish radio communications with them, and make identification. The location of the aircraft is to be determined with an accuracy of within 180 meters and communications can be maintained with no less than 100 aircraft at the same time. It is planned to use the UCNI system for conducting rescue operations since it can give the coordinates of both aircraft and ships in trouble as well as those located near them. Moreover, they are studying the problem of using the system for avoiding emergency situations on aircraft and ships by monitoring the operation of their on-board equipment.

Communications satellites are used by the U.S. Department of Defense primarily for strategic purposes, for communications between staffs of large units and formations in various theaters of military operations and with the Pentagon. In addition, work is being done to create a satellite system for tactical communications for various sized units in individual theaters of military operations.

At the present time strategic communications are provided only by the "Syncom" type satellite located over the Pacific Ocean and the temporary IDCSP system of communications functioning with 22 satellites located in close to synchronous orbits and more than 30 mobile and stationary ground stations. In addition, for strategic communications the U.S. leases a number of channels from the commercial communications system of the international consortium "Intelsat."

The equipment of the satellites of the IDCSP system operate on a frequency range of 7,000-8,000 megacycles. The length of their active existence is 3 to 6 years. The Americans are using the system successfully for transmitting photographs from South Vietnam to the U.S. which takes about 6 minutes (two satellites and four ground stations participate in the transmission). In addition, satellites of this system are used for transmitting information on the launching of space objects in the USSR to the anti-space defense center from the radiotechnical reconnaissance station on Shemya Island.

The DSCS system will be a result of further development of the IDCSP system. It is planned to put it into operation in two stages. In the first stage (before 1972) it is planned to put the DSCS-1 system into operation. It will include only four satellites, but with greater possibilities with respect to the kind of work (communications by phone, letter-printing and digital; transmission of television pictures), the number of channels of communication (several hundred), and the territory covered (the diameter of the zone of communications on the earth's surface will be 1,600-3,200 kilometers). The launching of the first pair of satellites was planned for March, and the second for November of 1971. The sizes of the satellites of the DSCS-1 system are as follows: 3.6 meters (length) by 2.7 meters (diameter) and a weight of 445 kilograms. For ground stations it is planned to use modified stations created for the IDCSP system. The centimetric wave band has been chosen for the operation: "earth--satellite" communications, 7,900-8,400 megacycles; "satellite--earth," 7,250-7,750 megacycles; transmission of telemetric data in the frequency range of 2,200-2,300 megacycles; and transmission of command information in the 1,700-1,800 megacycle frequency range.¹⁰

The satellite system of tactical communications is being created in the U.S. for use by all three branches of the armed forces: experimental testing is being conducted on the basic concept of communications and the principle of multistation access and they are also developing both ground stationed mobile and portable stations and stations intended for installation on ships and aircraft. The experiments are being conducted using the "LES-5," "LES-6," and "TacSat-1" satellites launched in 1967, 1968 and 1969 respectively. The last is located in a stationary orbit over a point on the equator of 108 degrees west longitude. Its equipment operates on the centimetric and decimetric radio wave bands and provides telephone and letter-printing communications and also transmission of numerical data.

It has been indicated that the preliminary results of the experiments have confirmed the expediency of the work for creating a satellite system of tactical communications and the favorable prospects for using it for communications with mobile land objects, ships, airplanes and helicopters. To use the system of communications with submarines, it has been suggested that the "wave guide" type of antenna systems developed previously for ground stations be installed on the ships.

Manned orbital stations. As early as the beginning of the 1960s the U.S. advanced the MOL program which envisioned creating a military manned laboratory and sending it into orbit around the earth by 1970. It was intended for conducting reconnaissance and observation, early warning of missile launching, and detection and identification of artificial earth satellites. But because of the fact that the implementation of the program was held up a great deal and the program itself turned out to be

technically outdated, in the middle of 1969 the U.S. Department of Defense had to abandon it. There was also a certain amount of duplication with the work of NASA which by that time had begun to create technically better designs for the "Skylab-1" manned orbital station. Through negotiations, the Department of Defense obtained NASA's agreement to participate in the work for creating the "Skylab-1" station and later to operate it jointly. In exchange, the Department of Defense gave NASA the "MOL" life support system it had developed, a complex trainer, ground support equipment, and also 8 of the 14 astronauts they intended to use for the flights of the "MOL" station.

The Americans plan to launch the "Skylab-1" manned orbital station in November of 1972 in an orbit at an altitude of about 400 kilometers with an inclination angle of 50 degrees. During the flight it is planned to change the crew of astronauts on the station three times. Each crew will have three men. The basic task of the first crew is to study the possibility of men working in space for an extended period of time; the second is to carry out a program of astronomical observations; and the third is to conduct experiments for studying the earth's natural resources. The duration of the work of each crew will be about 8 weeks. The station will be a modified variant of the third stage of the "Saturn-5" booster rocket, equipped with a special air lock and docking device. The air lock which is 5.2 meters long and 1.8 meters in diameter allows the astronauts to go out into open space through a special hatch. The total weight of the station is about 60 tons.

It is planned to launch the "Skylab-1" station into orbit with the "Saturn-5" booster rocket while the astronauts and their replacement crews will be taken to the station by the main unit of the "Apollo" spacecraft which will be launched by a "Saturn-1B" booster rocket. The primary compartment of the station will be an empty hydrogen cylinder 7 meters in diameter and about 17 meters long, divided along its length by an aluminum partition into two levels. The first level (in the rear part of the tank) will be used by the crew as a living area (for resting, preparing and eating meals, personal hygiene, and so forth) and the second, as a work area.

It is though that launching and operating the "Skylab-1" manned station will make it possible to obtain valuable experience in the use of similar stations for repairing space equipment in orbit, for returning it to earth, and also for inspecting artificial earth satellites with unknown missions. Moreover, this station can serve as a prototype for creating larger stations capable of accommodating 6 to 12, and in the future, 50 to 100 people.

Manned spaceships for repeated use are being developed jointly by NASA and the U.S. Air Force¹¹, which shows that they are to be used not only for

civilian purposes (delivering people and cargo to scientific research orbital stations), but also for military purposes. It is not out of the question that the Air Force will service the entire manned space system, including the launch equipment and the landing strips, and that the ships will be used jointly, except in cases where purely military missions will be performed. It is thought that, in terms of military purposes, manned spacecraft will be used for capturing and inspecting unknown artificial earth satellites, conducting reconnaissance from space, delivering crews and equipment to space observation points and lunar military bases, and placing military satellites in geocentric orbits and returning them to earth.

First, (by 1978-1980), the Americans plan to create an "earth-orbit" type of spaceship. The preliminary plan envisions a two-stage design for the ship, both stages being parallel and equipped with wings, thus looking like an airplane.

Each stage will have its own engines, one primary and three auxiliary. The main engine of the first stage is intended for launching the ship, and the second stage for putting it into the given orbit.

The auxiliary engines will be used for maneuvering when carrying out assignments in space, orientation, maneuvering when landing, and performing other tasks. It is thought that both stages should be manned and each should be controlled by two pilots. It is planned that the ship will be launched from a vertical position. After the spacecraft has reached a speed of 0.8 kilometers per second, the first stage will be separated from the second and put into horizontal flight and then will land at an airfield in the area of the launch complex. It will be in flight about 2 hours.

The second stage will use its own engines for orbital insertion and leaving orbit when returning to earth. The duration of the flight of the second stage will be from 7 to 30 days. The landing will take place at a speed of 300 kilometers per hour on a strip 3 kilometers long. For landing purposes the Americans think it will be possible to use the strip constructed at one time for launching the "Regulus" guided missile from Merrit Island (near Cape Kennedy).

According to estimates, the cost of one launching will be 3 to 4 million dollars and will be less than the cost of putting a satellite into orbit. It is thought that using manned spaceships will reduce the cost of putting 1 kilogram of cargo into earth orbit to 65 dollars, which will contribute to increasing the number of tasks capable of being performed, increasing the length of operation of the ships, and to reducing expenditures for ground facilities and repair of the ships.¹²

From what has been said, one can see that the U.S. military space systems and equipment are constantly being improved on the basis of technical and technological achievements and accumulated experience. With the goal of reducing expenditures on space systems, there is a tendency toward creating multipurpose satellites and manned spacecraft for repeated use, and the latter, apparently, will become the basis of the entire U.S. space program up to 1980, just as in the 1960s the basis was the "Apollo" program which had as its goal putting a man on the moon.¹³

FOOTNOTES

1. Aerospace Daily, August 6, 1970.
2. Aviation Week, September 15, 1969.
3. Aerospace Daily, December 12, 1969.
4. Electronic News, August 20, 1969.
5. Interavia Air Letters, November 10, 1970.
6. Interavia Air Letters, December 4, 1970.
7. Electronic News, October 6, 1969.
8. Aerospace Daily, August 19, 1970.
9. New Scientist, July 2, 1970.
10. Flight, September 25, 1969.
11. Space World, July, 1970.
12. Aviation Week, September 22, 1969.
13. Aerospace Daily, December 12, 1969.

SOME TRENDS IN THE DEVELOPMENT OF THE THEORY OF OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

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About 10 years ago an article entitled "Operations Research (A Brief Survey of Books Translated into Russian)" appeared in Voyennaya Mysl' (No 12, 1961). What is operations research? Where did it come from? What use is it or can it be to the military? Many readers have asked these questions. One can judge the attention focused on this problem by the fact that in the period 1963-1964 16 persons (not including the authors of three book reviews) participated in a debate conducted in this journal on the topic "Tasks and Content of Theory of Operations Research."¹

Enough time has passed since then to reach certain conclusions, to assess the path trod by this area of scientific inquiry, to determine the dialectics of its development, the practical results of its application, as well as prospects for the future. We shall endeavor within the confines of a journal article to answer at least some of these questions. First of all we shall determine what caused the genesis and rapid development of operations research theory and why it has gained such popularity and practical recognition in such a short time.

This phenomenon is based on an extraordinarily increasing complexity of managing purposeful human activity in any practical area, including the military.

The brief duration of combat, rapid situation changes, employment of powerful weapons, and a constant increase in the volume of work to be performed by the commander and his responsibility for its results demand a sharp increase in efficiency of management and substantiation of decision. The former is achieved to a significant degree by technically equipping the entire control system, by adopting means of mechanization and automation of management and control processes; the latter is achieved by extensive employment of theory of operations research.

Defining the Term

We read in the Great Soviet Encyclopedia: "The task of operations research is scientific analysis of operations, which makes it possible to select an optimal variant, that is, a system of management ensuring optimal achievement of the goal of the operation."²

We find a more precise definition in the first volume of the Automation of Production and Industrial Electronics encyclopedia. Operations research is "a field of science which studies problems of selection of solutions pertaining to the organization and control of purposeful processes (operations)."³

One non-Soviet work which is considered a "classic" states that "operations research in the broadest sense of the term can be characterized as the application of scientific principles, methods and means to problems connected with the functioning of organization systems, with the goal of offering optimal solutions to those who control or manage these systems."⁴

Professor Ye. S. Venttsel', who was the first to synthesize the basic principles of operations research and to elaborate methods of applying them to solving the problems of estimating the combat effectiveness of aviation complexes and their weapons, gives the following definition: "Operations research is a term applied to a special science which deals in rational methods of organizing purposeful human activity."⁵

In another basic study devoted to utilization of operations research methods in the military, an attempt is made to concretize this definition: "Operations research constitutes an aggregate of scientific methods with the aid of which an operation is analyzed and quantitative foundations and recommendations are elaborated, pertaining to its optimal organization and conduct."⁶

Finally, in one of the most recent and complete studies of this subject we read: "Scientific research undertaken for the purpose of elaborating proposals for decision-making has been given the designation operations research."⁷ It is emphasized thereby that one should distinguish operations research -- the practical activities of control and management entities, and particularly consultative scientific teams or institutes under the commander (supervisor), and theory of operations research -- a science which elaborates the ways and methods of research to be applied in these practical activities.

This same author gives the following definition in another work: "Operations research is a rapidly developing science of mathematical models and methods of substantiating decision in purposeful activity of any scope and character."⁸

An analysis of these and many other definitions of theory of operations research, both here and abroad, offers a general picture of the subject and content of this theory, although it also attests to the fact that the majority of definitions are still inadequately complete. In particular, they do not reveal various aspects of the term "decision [or solution]." And yet this is of substantial importance. If, for example, one views

decision as selection of reasonable design parameters for equipment under development, then operations research will ensure selection of the optimal decision from a number of variants. If one views decision as a selection of methods of employment of resources and means in processes in which not all elements are known and not all known conditions can be quantitatively expressed, then operations research cannot provide an unequivocal solution. In the latter case its methods can help determine not a solution but merely quantitative bases for reaching it, which would be taken into consideration alongside subjective, psychological, moral and other factors. "...Conclusions reached as a result of a quantitative study do not constitute a decision in the full sense of the word but merely a basis for reaching a decision, which as a whole constitutes the result of intensive productive activity of staff personnel and commander volition."⁹

Finally, some of the above definitions do not precisely express the dialectical-materialist basis of operations research theory. It consists in the fact that operations research is based on the elucidation, mathematical description and conscious utilization (or neutralization) of objective laws governing controlled (organized) processes under the concrete conditions of such processes, in their interlinks and relationships.

In our opinion operations research should be defined as a scientific theory which on the basis of mathematical description and examination of the objective patterns of purposeful processes, taking into consideration the conditions involved in these processes (including random), helps obtain quantitative bases which make it possible in combination with qualitative indices to reach the most reasonable and rational decision pertaining to control or management of these processes.

Operations Research and Mathematics

The extensive employment in operations research theory of an extremely diversified and solid mathematical edifice has led to a situation whereby some scientists have begun to consider this theory proper as mathematics. For example, we find the following definition in a recently-published book: "Operations research and systems analysis is an applied mathematical science dealing with the ways and methods of maximum efficient organization of purposeful human activity in various areas of practical social activity."¹⁰ In an annotation to another book, a translated work, we read: "Operations research is a new area of applied mathematics dealing with decision-making."¹¹ Even in an issue of Voyennaya Mysl' one can encounter the statement that operations research "is a special division of mathematics."¹²

The calling of theory of operations research a mathematics discipline is apparently caused by erroneously equating the techniques and methods of this theory with those areas of mathematics whose development has been primarily determined by the problems of operations research: linear, non-linear and dynamic programming, games theory, queueing theory, etc. This view is basically erroneous, since it distorts the essence and content of operations research as a scientific theory dealing with quantitative substantiation of rational decisions. Operations research theory in our opinion is not an area of mathematics nor an aggregate of mathematical disciplines. It is more an applied science which makes extensive use of mathematics. It makes as little sense to equate it with mathematics as is the case with nuclear physics, aerodynamics, and strength of materials, although their existence would be out of the question without the utilization of a powerful and diversified mathematics edifice.

It is interesting to note that a number of foreign scientists represent an opposing point of view in this matter. And from this proceed views on the limits of application of theory of operations research in military affairs and on the question of who should deal with them. For example, American scientist T. Saaty in his book Mathematical Methods of Operations Research expresses the opinion that application of operations research methods for solving practical problems should be done solely by specialist mathematicians. He also believes that "statement of the objectives of an operation and action on the basis of recommendations essentially do not come within the sphere of activity of the operations researcher but are in fact limiting conditions imposed on his freedom of action."¹³

We cannot agree with this view. He violates the dialectical unity and interrelationship of goal, methods of achieving it and methods of utilizing obtained results. In addition, if the research goal has been incorrectly stated, no satisfactory result can be achieved, no matter how sophisticated the mathematics edifice we employ. On the other hand, even good recommendations cannot be employed until we find a felicitous method of their utilization, which corresponds to concrete conditions and the specific situation. Thus statement of research objectives and the finding of forms and methods of implementing research results comprise an inseparable part of the content of this theory. In order to investigate complex problems it is necessary to involve specialists of various areas of specialization, including mathematicians. The determining role, however, is played by the applied science specialist. In our case it will be the military specialist, who should possess appropriate practical experience, possess a high degree of operational-tactical training, a certain minimum knowledge of mathematics and a clear idea of the content, capabilities, limitations, methods, techniques and forms of employment of operations research theory. Particularly important is good operational-tactical training, without which correct statement of the research problems and successful implementation of research results are impossible.

Application of Theory of Operations Research in Military Affairs

Theory of operations research is a very broad scientific theory which is applicable to many areas of human activity. Its utilization in military affairs is assuming such a scale and acquiring such features that an inevitable need arises to isolate from general theory of operations research that part which pertains to solving specific military problems.

Analysis of the history of development of theory of operations research indicates that, having arisen in the area of military problems research,¹⁴ it has been extensively employed in the study of many other purposeful controlled processes¹⁵ and, becoming enriched with new methods of analysis and a more sophisticated mathematical edifice, has returned to its source. Today operations research methods are equally applicable in the most varied areas of human activity. The specific features of investigation of military operations at the present stage of the military technological revolution, however, in our opinion demand that we separate from theory of operations research a special military science specialization as an applied area of operations research for solving problems of military science and military art.

This area of scientific investigation should contain a methodology for obtaining quantitative bases for reaching reasonable and efficient decisions pertaining to organization, preparation and conduct of combat operations, efficient control of men and equipment in the engagement and operation, as well as in designing weapons and assessing their combat effectiveness.

Military art most fully and comprehensively encompasses and elucidates the laws pertaining to preparing for and conducting combat operations of various types and scale, taking into account all objective and subjective conditions and factors, including combat, political, moral, volitional, etc. The methodology of military application of theory of operations research, which deals with the quantitative aspect of objective laws, occupies an auxiliary, subordinate status in relation to military art.

It is essential to bear in mind this obvious truth, because a tendency to consider operations research (including in military affairs) "decision theory" and even a "science of decisions" has been noted in the stream of translated literature which has flooded our bookshelves in recent years.¹⁶

What are the fundamental areas of application of theory of operations research in the military?

The first area is "assessment of the effectiveness of an individual unit or complex of equipment and weapons." The second is "assessment of the effectiveness of weapons systems." The third is "assessment of the combat capabilities of forces." The fourth is "finding optimal variants of troop combat actions."¹⁷ Up to the present time considerable success has already been achieved in solving problems pertaining to the first two areas. Things are somewhat more difficult as regards problems connected with the third and particularly the fourth area.

The purpose of stating these problems is to obtain an answer to the following question: "1. What is the anticipated result of actions according to the present plan of utilization of allocated resources and means? 2. What are manpower and material requirements in order to achieve the specified result, taking into account enemy countermeasures? 3. What is the optimal plan of action for available manpower and materiel?"¹⁸

Electronic computers, calculators, as well as such simple but effective means of performing operational-tactical calculations as slide rules, graphs, tables and nomograms are extensively employed in solving these problems.

The procedure of applying theory of operations research in solving specific operational-tactical problems consists in the following sequence of actions.

1. Determination of the objective of the operation and statement of the research problem as a consequence of a natural endeavor to obtain as favorable a result as possible. Determination of the goal and formulation of the research problem constitutes the most important and critical stage of logical-mathematical examination of military operations.

2. Construction of an operation model, that is a simplified scheme convenient for study. The model should reflect the essence of the phenomenon under examination, but should be much simpler than the original and provide the capability of detailed and rigorous analysis.

3. Analysis as a rule of a substantial number of variants of achieving the stated objective.

4. Evaluation of the effectiveness of actions on these variants (effectiveness is defined as the degree of conformity between the operations and the stated goal). For this it is necessary to select a criterion of effectiveness and to determine its numerical value for each solution variant. Selection of the criterion of effectiveness is one of the most difficult elements of mathematical investigation of military operations.

5. Search for the most purposeful (optimal) action (solution) variants under the given conditions. After the effectiveness of action variants is evaluated with the aid of the selected criterion, one must select the best of these or those which are most acceptable under the specified conditions.

These actions are accompanied by employment of a diversified mathematical edifice (both the existing one and a newly-created one for specifically-arising problems), with the aim of quantitative description of the phenomenon and optimization of the selected effectiveness criterion.

Systems Analysis

Additional evidence of the necessity of isolating and developing a specific methodology of logical-mathematical investigation of military operations and its employment in analyzing major operational-tactical problems is the development and popularization both here and abroad of so-called "systems analysis."

In the opinion of American scientists, the history of development of this scientific field boils down to the following. After World War II efforts to develop weapons systems on the basis of assessment of the effectiveness of possible alternatives, that is, utilizing operations research methodology, were conducted on the principle of formal optimization: "Nothing but the best." With the coming of the "atomic age" the cost of weapons development increased astronomically, and this approach became unacceptable. It was gradually replaced by another: "Only that which is essential, and at minimum cost." The methods employed in business and industry, as well as operations research models developed up to that time could not be employed due to their inherent limitations.¹⁹ Methods were needed which would make it possible to analyze complex problems as a whole, which would ensure the examination of variables and the requisite completeness of each alternative, would help introduce measurability and would make it possible to reflect indeterminacy. The broad and universal problem-solving methodology obtained as a result of development and synthesis was called by its authors "systems analysis." The new methodology was employed primarily in military affairs.²⁰ It is emphasized thereby that employment of systems analysis is more essential in the military, where it is the sole means of maintaining objectivity.²¹

It is pointed out that in examining modern methods of decision-making it is essential to assign operations research to the first stage of a three-phase cycle of increasing complexity: operations research; evaluation according to cost effectiveness criteria; systems analysis.²²

It is noted that during those same years when systems analysis was developing, a number of adjacent disciplines appeared in the United States and elsewhere (or enlarged the areas of their application), bearing unusual names: operations research, heuristic science, theory of decisions, theory of large systems, general theory of systems, and others. The joint existence of all these disciplines could not help but give rise to questions pertaining to their limits, relationships and position within the entire complex of sciences.²³ Doctor of Military Sciences I. I. Anureyev made the most clear-cut demarcation among many of these concepts in his preface to Quade's Analysis of Complex Systems. It was necessary to give a brief determination of their content and area of application.

Operations research is defined as the science dealing with elaboration of quantitative recommendations necessary in the planning and organization of operations. Theory of large systems is a young science which studies methods of synthesizing large systems on the basis of study of the methods of functioning of its separate elements. It is at present more of a technical science, the results of which are utilized in planning systems of any nature. Systems analysis is a logical-analytical method employed for long-range planning in developing complex systems and carrying out large-scale measures under conditions of indefiniteness.

Systems analysis arose as a development of operations research methodology. Systems analysis methods are close to operations research methods, but there are characteristic differences. The main difference in the methods of both disciplines, in the opinion of many scientists, lies in the fact that mathematical methods, particularly mathematical simulation, are the principal element in operations research, while in systems analysis they are merely a supplement to logical methods. Exceptionally great importance in systems analysis is attached to methods of economic assessment, taking into account countermeasures by the adversary and indeterminacies.

As applied to military problems, all problems of systems analysis can be divided into three types: 1) problems connected with establishing the foundations of general structure of armed forces; 2) problems connected with formulating the demands to be met by weapons systems, in order to be effective in accomplishing the missions of the armed forces branches; 3) problems the solution of which aims at efficient utilization of funds allocated for weapons system development.

Some American scientists are not inclined to make such a sharp distinction between operations research and systems analysis. It is claimed, for example, that the term "operations research" is used both in a narrow definition -- to designate analysis the objective of which is to increase the efficiency of organized machine-man systems, and in the broad definition, encompassing almost all types of quantitative analysis. E. Quade draws the conclusion that in this definition the term is identical (or

should be identical) to that area of knowledge and methods which we call systems analysis.

There are also other opinions, such as that systems analysis is the methodology of solving large problems, based on the systems concept. It is again stressed that the main content of systems analysis is found not in the formal mathematical edifice describing "systems" and "problem solving" (although there have been attempts to create such an edifice) and not in special mathematical methods such as assessment of indefiniteness (although some work has also been done in this area), but rather in its conceptual edifice, in its ideas, approach and principles.²⁴

Some authors note the expediency of extending systems analysis methods from the area of strategic studies to lower echelons. It is claimed that systems analysis is needed not only by the Department of Defense, Joint Chiefs of Staff or the staffs of the branches, but also at other levels in the military command structure. The ultimate objective of systems analysis is to reduce the indefiniteness which command personnel encounter in selecting one of many possible decision variants. This selection should be made at the most varied levels.²⁵

Basic Conclusions

If we synthesize all the above views on the development of scientific methods of solving complex problems, we can note the following.

1. Theory of operations research was developed in order to obtain a quantitative basis for solving complex military problems. The mathematical edifice of operations research, to which considerable attention was initially devoted and which proved extremely effective in solving military technical problems (weapons assessment and selection, etc), has begun to be widely employed in many nonmilitary fields. Operations research is widely utilized, with emphasis on its mathematical aspect.

2. The specific features of military problems in general and of study of large-scale complex problems, such as the development of strategic weapons systems demanded improved operations research methodology, which in the final analysis led to the development of systems analysis methods.

3. The process of subsequent development of operations research methodology was characterized by the following features:

enlargement of the scale of research, an approach to the problem as a whole, and development of a systems approach;

deepening of analysis and consideration of the specific features of solving military problems;

a shift of emphasis in research from technical to general military problems;

withdrawal of the mathematical edifice to a secondary position and enhancement of the role of general methodological research principles;

enhancement of the role and increased research participation on the part of the military specialist (expert) in a given area.

4. This objective process confirms the necessity of isolating from general theory of operations research a specific methodology of investigating military, particularly operational-tactical, problems on the basis of a combination of logical and mathematical methods, with the primacy of the former and subordinate status of the latter, expressed in attempts to formulate the principles of methodology of logical-mathematical investigation of military operations.

5. Further development of these methods is contemplated, with an even greater participation by man, in spite of improvement of the mathematical edifice and the employment of an increasingly larger number of more sophisticated computers.

Interesting in light of this last point are reviews of some American experts on the role in operations research and systems analysis of mathematical methods and man the organizer, supervisor and beneficiary of research. [Ch. Khitch], rector of the University of California, claims that analytic methods (mathematical models) and computers can prove extremely useful in analysis of complex military problems. At the same time there are many military problems where these methods and means are practically unnecessary, which, however, does not exclude the necessity of determination of alternatives and their comparative assessment. In those cases where mathematical methods and computers are applicable, they are by no means an alternative or competitor to good intuitive judgments. These methods and means only supplement reasoning.

Khitch writes that systems analysis is only a method of preparing data of interest to the executive, in that form which is most convenient for him. This method does not replace the common-sense judgment of the military specialist which is based on experience. Essentially analysis results should be viewed as one of the forms of information needed by the executive for decision-making.

Analyzing the trend in evolution of methodology of solving complex problems, one can conclude that there has been an increase in the specific weight of creative thinking even in the course of research proper. It is not surprising that American scientist E. Quade states that systems analysis is based more on judgments in appraisal of input data than on real measurements or engineer computations. The structure and input values of the model may have no other substantiation than the intuition and personal experience of the investigator or the opinions of the expert on a given matter. In other words there is increasing acknowledgment of the role of the creative element, that is heuristic, at all stages of investigation (even in determining input data for simulation) in a close unity with modern mathematical and traditional logical methods. This important idea, however, which is of decisive significance for the area of operational-tactical research, has not yet received further elaboration.

The most fully described in contemporary Soviet literature are the theoretical foundations, the mathematical edifice and, most importantly, the practical results of utilizing operations research in assessing the effectiveness of air force and naval weapons in the above-mentioned studies by Ye. S. Venttsel', Yu. G. Mil'gram, I. Ya. Diner and others. The writings of N. P. Buslenko are devoted to the problems of theory of large systems,²⁶ those of Yu. Chuyev²⁷ to assessment of the effectiveness of weapons systems, etc. In these areas employment of operations research has proven highly effective and has become a commonplace occurrence.

In the area of the military much remains to be done in order to concretize the ways and forms of utilization of operations research methods applicable to operational-tactical problems. An important landmark in this area is the book by Anureyev and Tatarchenko entitled Employment of Mathematical Methods in Military Affairs. A new book by Yu. V. Chuyev was recently published.²⁸

At the present time apparently the main trend in this area should be the extensive study and practical adoption of operations research methods in the activities of commanders and staffs of all echelons, with the aim of further increasing the efficiency and validity of decisions in the operation and engagement, as well as in military scientific effort connected with elaborating methods and forms of combat operations.

FOOTNOTES

1. Voyennaya Mysl', No 7, 12, 1963; No 2, 4, 9, 1964.
2. Bol'shaya Sovetskaya Entsiklopediya, Volume 51, 1958, page 217.

3. Avtomatizatsiya proizvodstva i promyshlennaya elektronika, Volume 1, 1962, page 518.
4. U. Cherchmen; R. Akof; L. Arnof: Vvedeniye v issledovaniye operatsiy (Introduction to Operations Research), Izd-vo Nauka, 1968, page 17.
5. Ye. S. Venttsel': Vvedeniye v issledovaniye operatsiy (Introduction to Operations Research), Izd-vo Sovetskoye Radio, 1964, page 3.
6. Yu. G. Mil'gram: Issledovaniye operatsiy i algoritimizatsiya boyevykh deystviy (Operations Research and Algorithmization of Combat Operations), Izd. VVIA, 1968, page 8.
7. I. Ya. Diner: Issledovaniye operatsiy (Operations Research), Izd. VMOULA, 1969, page 6.
8. I. Ya. Diner: "Some Trends in the Development of Operations Research," Morskoy Sbornik, No 1, 1970, page 32.
9. I. Anureyev and A. Tatarchenko: Primeneniye matematicheskikh metodov v voyennom dele (Application of Mathematical Methods in Military Affairs), Voenizdat, 1967, page 33.
10. V. V. Trigubenko: Chto takoye issledovaniye operatsiy (What Is Operations Research), Izd-vo Ekonomika, 1966, page 6.
11. A. Kofman and R. For: Zaymemya issledovaniyem operatsiy (Let Us Engage in Operations Research), Izd-vo Mir, 1966, dust jacket.
12. Voyennaya Mysl', No 10, 1969, page 24.
13. T. L. Saati: Matematicheskiye metody issledovaniy operatsiy (Mathematical Methods of Operations Research), Voenizdat, 1963, pp 11-12.
14. F. M. Morz and Dzh. Ye. Kimbell: Metody issledovaniya operatsiy (Methods of Operations Research), Izd-vo Sovetskoye Radio, 1956.
15. Kofman and For, op.cit.; Cherchmen et al, op.cit.
16. Issledovaniye operatsiy na praktike (Practical Operations Research), Voenizdat, 1962, page 224.
17. A. Anureyev: "Mathematical Methods in Military Affairs," Voyennaya Mysl', No 9, 1966, pp 39-42.
18. Anureyev and Tatarchenko, op.cit., page 7.

19. E. Kveyd: Analiz slozhnykh sistem (Analysis of Complex Systems), Izd-vo Sovetskoye Radio, 1969.
20. S. L. Optner: Sistemnyy analiz dlya resheniya delovykh i promyshlennykh problem (Systems Analysis for Solving Problems in Business and Industry), Izd-vo Sovetskoye Radio, 1969, page 9.
21. Ch. Khitch: Rukovodstvo oboronoy. Osnovy prinyatiya resheniy (Defense Management. Fundamentals of Decision-Making), Izd-vo Sovetskoye Radio, 1968.
22. Military Review, October 1969, page 61.
23. Optner, op.cit.
24. Ibid., page 10.
25. Khitch, op.cit., page 78.
26. N.P. Buslenko: Modelirovaniye slozhnykh sistem (Simulating Complex Systems), Izd-vo Nauka, 1968.
27. Yu. V. Chuyev et al: Osnovy issledovaniya operatsiy v voyennoy tekhnike (Fundamentals of Operations Research in Military Technology), Izd-vo Sovetskoye Radio, 1965.
28. Yu. V. Chuyev: Issledovaniye operatsiy v voyennom dele (Operations Research in Military Affairs), Voenizdat, 1970.

COMMUNIST ETHICS AND MILITARY DUTY

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Investigation of the position, role, and significance of communist ethics and the performance of military duty by Soviet people is of exceptional theoretical and practical interest. This is explained by the special function of ethics among the other forms of social awareness. It is a kind of reflection of social interests and corresponding ideas in the norms of the daily behavior of citizens and in their attitudes toward work, comrades, the collective and society. Politics, philosophy, art and science find their real force through ethics. The special function of ethics in the "materialization" of ideas, that is, their transformation into material force, is emphasized by the 24th CPSU Congress. L. I. Brezhnev said, "even the most advanced ideology becomes a real force only when it is taken over by the masses, when it incites them to active deeds, and when it determines the norms of their daily behavior."

A profound clarification of the role of ethics in performing military duty is an important condition for the successful activity of educators. The book by Major General A. S. Milovidov, doctor of philosophical sciences and professor, entitled Kommunisticheskaya Moral' i Voinskiy Dolg¹ makes a noteworthy contribution to the further development of this problem.

The work being reviewed consists of seven chapters with the following titles: Soviet Military Duty as a Moral Obligation; The Moral and Legal Basis of Soviet Military Duty; The Structure of the Moral Awareness of Duty; Military Technical Knowledge, Morality and Military Duty; the Aesthetic in Military Work; Unity of Goals and Means of Shaping Communist Morality and Awareness of Duty; and the Ethical Criterion for Faithfulness to Military Duty.

The basic content of the book is devoted to investigating three major problems. The first is revealing the specifics of the effect of moral norms and principles regulating social relations and behavior of people in the sphere of military service when changing over from socialism to communism.

Second, the author tries to give a theoretical basis for the significance of communist ethics as one of the most important forms of social awareness in people's activity in defending the revolutionary conquests and ensuring the great combat readiness and combat efficiency of the armed forces. In this regard, a great deal of attention has been devoted to the development of moral standards themselves in the new stage of life of the country and the armed forces and also under the influence of the scientific and technical revolution and other processes of modern times.

Third, in the book the author made an attempt to interpret the experience of moral indoctrination accumulated in the troops, primarily the indoctrination for instilling communist ethics in the awareness and behavior of supervisory personnel and the officer corps. On the basis of the generalization of experience, the author tries to formulate practical recommendations and determine ways for fuller activation of moral forces motivating Soviet troops to self-sacrificing service for the good of the people.

The author investigates these problems on the basis of Marxist-Leninist methodology and a class political approach to analysis of Soviet military duty. After all, the freedom and well-being of the workers, the fate of the socialist structure and the revolutionary movement, and the progress of all mankind are inseparably linked to Soviet military duty.

The faithfulness of Soviet citizens to their military duty is one of the strongest factors in the power of the socialist state and the source of the ethical supremacy of its army and people over enemies in armed combat.

The first two chapters deal with the reasons for the increased significance of Soviet military duty under modern conditions. It is also pointed out that it has been enriched with new content reflecting changes in the alignment of class forces in the world and in the antagonism between the two social systems, the consequences of the scientific and technical revolution, and other processes. For example, the international duties of the Soviet Armed Forces have been considerably expanded. Finally, performance of military duty has now become a complex, difficult, and exceedingly responsible job because the army has been supplied with the latest technical equipment.

The book emphasizes that now, just as formerly, the responsibility of citizens for performance of their military duty is increasing because of improvement in the system of legislative and juridical laws determining their military activity and also because of the higher level of political and moral indoctrination.

But, as we know, the force of Soviet military duty lies not so much in the fact that it is legally compulsory as in the fact that citizens are deeply aware of their obligation for defending the homeland. They are filled with a sense of these obligations, accept them as their personal command and sacred duty to society, and perform them voluntarily with maximum output of efforts and capabilities, conscientiously, and honorably. A profound understanding of the interrelationship between the legal and moral aspects of military duty is a necessary condition for correct performance of the tasks of military indoctrination.

Because of this, officers and generals are very interested in the long-range view of the interrelationship between law and ethics, juridical and

moral standards, conviction and compulsion, and also the qualitative changes in compulsion (they are increasingly acquiring a moral nature), and so forth.

Substantiating the increased role of communist ethics in military work, the author concentrates most of his attention on the most important moral qualities of servicemen, and especially officers. Among these qualities are, for example, self-discipline. The 24th CPSU Congress mentioned once again the all-round development of this in personnel supervisors and all Soviet people. The congress instructions on this point are especially significant under army conditions.

Self-discipline is man's synthesizing moral quality wherein, in the final analysis, all the other moral characteristics come to a focal point. It reflects most clearly, profoundly and comprehensively the internal striving of an individual for exemplary performance of duty. This moral quality "compels" a person to be true to his duty under any circumstances and signifies a transformation of the latter into a sacred internal requirement of man. Self-discipline is expressed in an independent and voluntary determination of one's behavior in keeping with the higher interests of defending socialism and gives rise to maximal activity in performing training and combat missions. Its importance increases sharply in modern warfare where weapons of unprecedented power are used and where large and small units, subunits, groups and individual troops frequently have to act independently, separate from the main forces, left alone by themselves without any kind of control. Therefore, the author's conclusion is logical that "the fundamental line of development of the moral possibilities of military duty is the development of self-discipline." (p 49)

Self-discipline is divided into two aspects: very strict execution and freedom of will, that is, the ability to display creative initiative. The author analyzes in detail the Leninist methodological proposition that the new socialist discipline is "a discipline of independence and initiative in battle." (Polnoye Sobraniye Sochineniy [Complete Collected Works], Volume 36, p 500), that is, not passive, but active, not blind, but innovative. In this kind of discipline strict execution is combined with voluntary readiness to perform one's duty under any circumstances and, in particular, when for some reason or another, superior officers are unable to assign concrete tasks.

The author's reflection that the moral value of strict execution is decreased unless it is combined with initiative is of great interest. Unless obedience is combined with initiative, the soldier's activity becomes more haphazard ("If they order something, I act; if not, I sit and wait") and it can lead to a predicament in a very complex and unusual situation.

The book analyzes quite deeply the dialectics of execution and the creative initiative of servicemen. But, in our opinion, one should approach the question of the moral bases of creative initiative in the activity of military personnel more comprehensively. In particular, it should be more closely related to responsibility.

The 24th CPSU Congress designated the further increase in the responsibility of leaders at all levels as one of the most important tasks. It says in the Accountability Report of the CPSU Central Committee, "When decisions are made it should be quite clear who is responsible for them. And it should be equally clear who is responsible if an urgent decision is not made or delayed." It is as if the person with initiative takes on additional responsibility. Because of this, some people are inclined to refrain from initiative. Therefore, at the present time, the problem is to ask more of those who do not display initiative.

In our opinion when revealing the dependency between officer initiative and moral maturity one should also discuss other factors which could influence creative activity and weld or activate moral forces: the concrete situation in one collective or another, the work style of the superiors, and the specifics of the profession. The creation of a favorable situation for displaying the capabilities and talents of each person is extremely important in the army. Initiative can be restrained also by negative psychological factors: lack of confidence, "low self-esteem," and so forth. One cannot forget about this either.

We found the author's explorations in the area of complex and debatable questions extremely interesting too. More attention has been devoted to them because of the scientific and technical revolution. These questions are dealt with in the third, fourth, and fifth chapters.

The interrelations considered here between scientific knowledge and morals, organizational, technical and ethical norms are the subject of a sharp ideological conflict. By making the role of science and technology absolute, our ideological opponents distort the essence of ideology and ethics, proclaim an "end to ideology," and contrast ethical standards with a purely "scientific and technical approach" to resolving all social problems, including those within the framework of military science.

The author considers the real interaction of these elements in people's consciousness from dialectical materialistic positions. He shows that scientific knowledge, including military and technical, does not apply directly to the sphere of the ideological or moral. The content of the organizational and technical norms and rules associated with operating and employing combat technical equipment are also established as being beyond ethics. But this does not mean that scientific knowledge and organizational and technical norms are separated by an abyss from morality. They

are closely related to it and this link is extremely complex, indirect and contradictory. Analysis of it does not allow straightforwardness or onesidedness.

In our opinion, the real state of things is reflected by the author's arguments to the effect that organizational and technical norms have a moral coloring and their implementation is evaluated from a position of moral criteria. Military and technical norms reflect not only people's attitudes toward technical equipment, but also people's attitudes toward each other, beginning with the interrelations within the primary military collective and ending with complex relations with the people, the society, and the state. Scientific knowledge, as a means of achieving certain political goals, performs one moral function or another. The development of scientific knowledge and organizational and technical norms exerts a complex influence on ethics. There is also a reverse influence. The decisive condition determining the direction and results of this interrelationship is the social environment, the nature of the prevailing ideology.

The military and technical revolution has placed on servicemen an unprecedented responsibility for mastering modern armament and combat equipment and for efficient servicing and operation of it. As never before the performance of military duty depends on the level of scientific knowledge and the conscientious compliance with organizational and technical norms when dealing with armament. The book thoroughly criticizes one-sided exaggeration of technical knowledge and manifestations of nihilism with regard to ethics and unmasks the ideological sabotage of imperialist theoreticians in this area.

Everything related to the modern scientific and technical revolution is devoted to the higher interests of the class struggle, class ideologies, and ethics. With respect to our society and army, we are dealing with one of the aspects of the historic mission formulated by the 24th CPSU Congress: to organically combine the achievements of the scientific and technical revolution with the advantages of socialism, including the remarkable moral qualities of the new man.

The author quite justifiably devoted a great deal of attention to investigating the development of the moral norms themselves which lie at the basis of performing military duty. It is known that the scientific and technical revolution has led to a situation where certain moral ideas have disappeared from the scene and others -- and these are the majority -- are being enriched with new content. Finally, new moral forms (undesirable ones can also arise here) appear. The requirements for moral qualities of servicemen are also changing essentially.

Taking this into account, it is important to reveal and support the new positive tendencies which most adequately reflect the needs for further

strengthening of the armed forces and the utilization of the achievements of scientific and technical progress. Correspondingly, exposing the struggle against what is old in the area of ethics deserves more attention. The 24th Party Congress reminded us of this once again.

Consideration of these problems is closely related to analysis of the moral awareness of military duty (the chapter entitled "The Structure of the Moral Awareness of Duty") which includes many elements: ideological conviction, exalted feelings, will, habits, and so forth. Only as a totality do they ensure that military servicemen meet the requirements of military duty more fully. But this does not mean that all of the aforementioned elements are equal. Communist ideology is the main regulator of the behavior and activities of servicemen. Good ideology is the most valuable quality of servicemen, the most powerful weapon, and the truest orientation point for behavior and practical activity.

Because of this the book thoroughly criticizes the assertions of imperialist military theoreticians concerning the disappearance, the "loss" of ideological motives at critical moments in armed combat. A deep analysis of specific experiences during wars in defense of socialism enables the author to construct quite logical proof that, on the contrary, in critical moments a stimulating idea takes over the entire essence of the serviceman, is the strongest catalyst of the spiritual and physical efforts of the fighting men, and helps them to concentrate on conscientiously reaching their set goals.

Because of the special role of ideological conviction in the activity of servicemen and their indoctrination, it is given a central position in all troop training. Communist ideology penetrates all forms of training and education, including all military technical training.

The chapter entitled "Unity of Goals and Means of Forming Communist Morality and Awareness of Duty" considers the dialectical essence of the process of military education. The complexity of the moral element and the structure of the awareness of military duty require flexible use of various means of indoctrination as well as continuous creative exploration and inventiveness. It is especially inadmissible here to have any kind of canonization of individual means, unimaginative or onesided work, or orientation toward "solitary means," that is, metaphysical transformation of any of them into the "key" to all occurrences in life. The analysis of various methods and means of indoctrination is of considerable interest. These include high demandingness of people, personal examples, and so forth. The book attempts to define the rules of forming a healthy social opinion and points out the role of the commander, political workers, and party and Komsomol organizations in this important matter.

The final chapter defines the moral criteria of faithfulness to military duty. Trying to avoid onesidedness, which in the past has led to absolutization of one or another element of the criteria and caused no small amount of harm in the practice of indoctrinational work, the author tries to reveal the complex dialectic of all the variables of the moral criterion of awareness of military duty. The primary thing is practical activity and results and increasing the combat readiness and combat efficiency of the troops. Another important element in the evaluation of the conscientiousness of the serviceman is the content and motivation for his deeds and actions. Here the author has in mind not a single fact, but the totality of facts of behavior making it possible to reveal persistent characteristics of the serviceman's personality.

When evaluating the serviceman's conscientiousness, it is important to take into account the concrete circumstances of his actions and also the level at which he uses his capabilities and physical and spiritual forces in performing his military duty.

The book devotes a lot of space to criticism of idealistic and metaphysical views on the problem of military duty. It is known that bourgeois ideologists devote much attention to consideration of the significance of reason, feelings, and the will of people in the military service. Frequently they emphasize the role of conviction based on conclusions of the intellect as the basic component in awareness of duty. In the handbook for U.S. officers, for example, it says that "soldiers must not be sent into battle until they understand the goal of the battle and accept it with their hearts."

The author provides well-founded and weighty criticism on one of the fashionable aesthetic theories of the West, emotivism. This theory absolutizes the feeling aspect of ethics and ignores the true sources of the emotions. It frees a person from searching for the real reasons for events or for the justification of the purposes of battle. The essence of it lies in refraining "from arguments in their intellectual form and favors emotional judgement." (p 100) Exaggeration of the role of instincts and lower emotions, robotism, and subordination are all typical of present-day bourgeois theory in explaining the internal motivating forces lying at the basis of the activity of army personnel.

The book devotes a great deal of attention to problems of ideological and psychological training in the armies of imperialist states. Yet, in our opinion, the book does not sufficiently demonstrate that in these armies ideological conditioning, including the establishment of ethics which correspond to the interests of capitalism, is more important than psychological conditioning and controls the latter. Creating a superficial pseudo-scientific myth about the "high moral principles and goals" of armies of imperialism, the bourgeoisie spare no efforts in filling men's consciousness

to the limit with their theoretical fabrications and thus preventing the penetration of real knowledge about the given questions. In bourgeois armies we see an increasingly noticeable tendency to "scientifically" justify what are supposed to be the lofty moral bases of the "soldier's duty" using various ultramodern sociopolitical theories. Anticommunism and anti-Sovietism can no longer be reduced to crude, primitive, straightforward propaganda, but are being increasingly clothed in pseudoscientific forms.

One should note that the author does not deal equally with all the problems of the interrelationship between communist ethics and military duty raised in the book. This applies primarily to his treatment of new problems. And this is natural. I should like to request that in his next work on the subject the author devote more attention to revealing the role, position and significance of ethical means in the overall system of communist indoctrination and the moral, political and psychological training of troops in modern war. The problem of the specifics of the realization of communist ethics and control of moral processes in the sphere of military activity requires more thorough treatment. Because of the fact that problems of morality are acquiring ever greater importance in the ideological struggle, it would be useful not only to criticize individual tendencies, but to describe the basic trends of bourgeois military aesthetic thought as a whole.

In A. S. Milovidov's book propaganda officers and teachers will find interesting material, the understanding of which will be of great significance for further increasing the awareness of Soviet fighting men, developing their moral qualities, and for better performance of their military duties. The book being reviewed is a profound and original investigation of problems of Soviet military duty. It will meet with widespread approval from readers and will be used in the practice of indoctrinating personnel of the armed forces.

FOOTNOTE

1. A. S. Milovidov, Kommunisticheskaya moral' i voinskiy dolg (Communist Ethics and Military Duty), Moscow, Voenizdat, 1971, 184 pp.